SLV-E120AE/E220AE/UY/VP1/VP2/E270CP/VC1/VC2/ E280CP/UX/VC1/VC2

RMT-V206C/V206D/V207C/V207D/V207E/V207G/V207H

SERVICE MANUAL

AEP Model

SLV-E120AE/E220AE/VP1/VP2/E270CP/VC1/VC2/E280CP/VC1/VC2

UK Model

SLV-E220UY/E280UX

Photo : SLV-E280UX

SPECIFICATIONS

System (SLV-E220UY/E280UX)

Channel coverage
PAL (I) :
UHF B21 - B69
RF output signal
UHF I21 - 69 CH
Aerial out
75-ohm asymmetrical aerial socket

System (EXCEPT SLV-E220UY/E280UX)

Channel coverage
PAL (B, G) :
VHF E2 - E12
(compresse channel C)
(A - H only For Italy)
UHF E21 - E69
CATV S01 - S03, S1 - S20
HYPER BAND S21 - S41
Intermediate frequency
F1 - 1 Video 38.9MHz
F2 - 1 Audio 33.4MHz
RF output signal
UHF G22 - 69
Aerial out
75-ohm asymmetrical aerial socket

Inputs/outputs

EURO-AV1
21-pin
Video input : pin 20
Audio input : pins 2 and 6
Video output : pin 19
Audio output : pins 1 and 3
EURO-AV2 (2nd Scart)
21-pin (Except SLV-E120AE/E220 Series)
Video input : pin 20
Audio input : pins 2 and 6
Front Line In (SLV-E280 Series)
VIDEO IN, Phono jack (1)
Input signal : 0.5 –1.5 Vp-p
75 ohms, unbalanced, sync negative
AUDIO IN, Phone jack (1)
Input level : –8 dBs
(0 dBs = 0.755 Vrms)
Input impedance : more than
47 kilohoms

General

Power requirements
220 – 240 V AC, 50 Hz
Power consumption
17 W
5W (standby)(SLV-E120AE/E220 Series)
6W (standby)(Except SLV-E120AE/E220 Series)
Operating temperature
5°C to 40°C
Storage temperature
–20°C to 60°C
Dimensions
Approx. 360 x 97 x 298 mm (w/h/d)
including projecting parts and controls
Mass
Approx. 3.7 kg

Supplied accessories

Remote commander (1)
R6 (size AA) batteries (2)
Aerial cable (1)
Mains lead (1)

Design and specifications are subject to change without notice.

VHS PAL VIDEO CASSETTE RECORDER

MICROFILM

SONY®

SAFETY CHECK-OUT

After correcting the original service problem, perform the following safety check before releasing the set to the customer :

1. Check the area of your repair for unsoldered or poorly-soldered connections. Check the entire board surface for solder splashes and bridges.

2. Check the interboard wiring to ensure that no wires are "pinched" or contact high-wattage resistors.

3. Look for unauthorized replacement parts, particularly transistors, that were installed during a previous repair. Point them out to the customer and recommend their replacement.

4. Look for parts which, though functioning, show obvious signs of deterioration. Point them out to the customer and recommend their replacement.

5. Check the B+ voltage to see it is at the values specified.

SAFETY-RELATED COMPONENT WARNING!!

COMPONENTS IDENTIFIED BY MARK ⚠ OR DOTTED LINE WITH MARK ⚠ ON THE SCHEMATIC DIAGRAMS AND IN THE PARTS LIST ARE CRITICAL TO SAFE OPERATION. REPLACE THESE COMPONENTS WITH SONY PARTS WHOSE PART NUMBERS APPEAR AS SHOWN IN THIS MANUAL OR IN SUPPLEMENTS PUBLISHED BY SONY.

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SECTION 1
GENERAL

This section is extracted from SLV-E280UX instruction manual.

Step 1

Setting up the remote commander

Controlling other TVs with the remote commander

The remote commander is preprogrammed to control non-Sony TVs. If your TV is listed in the table below, set the appropriate manufacturer's code number.

1 Set TV/VIDEO at the top of the remote commander to TV.

2 Hold down ⏻, and enter your TV's code number(s) using the number buttons. Then release ⏻.

Now you can use the ⏻, VOL +/–, PROG +/–, number, WIDE and TV/VIDEO buttons to control your TV. For some TVs of other manufacturers WIDE may not function. To control the VCR, reset TV/VIDEO to VIDEO.

Code numbers of controllable TVs

If more than one code number is listed, try entering them one at a time until you find the one that works with your TV.

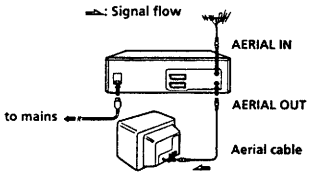
Manufacturer (Code number)		
Philips (06, 07, 08)	Nokia (15, 16, 69)	Toshiba (38)
Sony (01, 02)	Thomson (43)	Samsung (22, 23)
Grundig (10, 11)	Hitachi (24)	Saba (12, 13)
Telefunken (36)	Sanyo (25)	Sharp (29)
Panasonic (17, 49)	Ferguson (52)	Mitsubishi (27, 28, 50, 51)

Notes

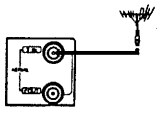
- If the TV uses a different code from the one programmed to work with your remote commander, you cannot control your TV with this remote commander.
- If you enter a new code number, the code number previously entered will be erased.
- When you replace the batteries of the remote commander, the code number automatically resets to 01 (Sony). Reset the appropriate code number.

Step 2

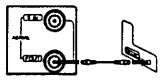
Connecting the VCR



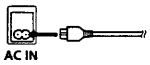
1 Disconnect the aerial cable from your TV and connect it to AERIAL IN on the rear panel of the VCR.



2 Connect AERIAL OUT of the VCR to the aerial input of your TV using the supplied aerial cable.

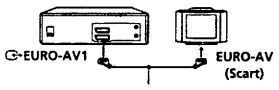


3 Connect AC IN of the VCR to the mains using the supplied mains lead.



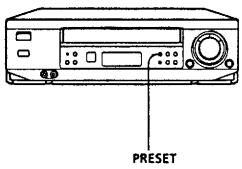
Additional connection

If your TV has a ⇨EURO-AV (Scart) connector, connecting the VCR and TV as shown on the right improves picture quality.



Step 3

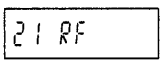
Tuning the TV to your VCR



If you have connected your VCR to the TV using the EURO-AV cable, skip this step and see "When using the EURO-AV cable" on the next page.

1 Make sure that the VCR is turned off.

2 PRESET ○ Press PRESET on the VCR for more than 3 seconds.



The power is automatically turned on.

The factory-preset RF channel appears in the display window.

The VCR signal is output through this channel to the TV.

3 Turn on your TV and select a programme position for the VCR picture.

This channel will now be referred to as the video channel.

4 Tune the TV to the same channel as that shown in the display window so that the picture on the right appears on the TV screen.

If this pattern does not appear clearly, press PROGRAM + to select another RF channel. Then tune the TV to the same channel. Repeat these steps until the picture pattern appears clearly.

Refer to your TV manual for tuning instructions.

5 PRESET ○ Press PRESET.

You have now tuned your TV to the VCR. From now on, whenever you want to play a tape, set the TV to the video channel.

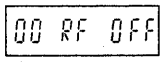
To check to see if the TV tuning is correct

Set the TV to the video channel and press PROGRAM +/– on the VCR. If the TV screen changes to a different programme each time you press PROGRAM +/–, the TV tuning is correct.

When using the EURO-AV cable

You can prevent interference from the other channels as follows:

1 Make sure that the VCR is turned off.
2 Press PRESET for more than 3 seconds.
3 Press 0 on the remote commander twice.
4 Press PRESET.



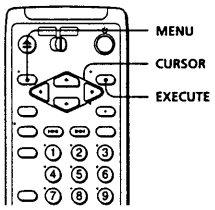
Note

- If you disconnect the EURO-AV cable, press PROGRAM +/– in step 3 above to turn on the RF channel.

Step 4

Selecting a language

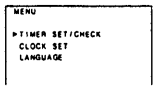
You can select one of ten languages for the on-screen display, using the remote commander. The initial setting is English.



1 MENU

Press MENU.

The following menu appears on the TV screen.



2 CURSOR, EXECUTE

Press CURSOR (♦/♦) to move the cursor (►) to LANGUAGE, then press EXECUTE.

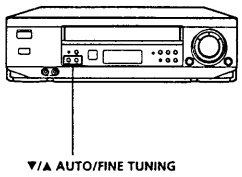
3 CURSOR, EXECUTE

Press CURSOR (♦/♦/♦/♦) to move the cursor (►) to the desired language, then press EXECUTE.

The menu disappears from the TV screen and the on-screen display is set to your language.

Step 5

Tuning the VCR to TV channels



1

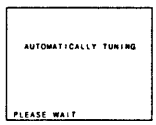
Set the TV to the video channel:

- If the TV is connected to the VCR using only the aerial cable, the TV should already be set to the programme position for the VCR.
- If the TV is connected to the VCR using the EURO-AV cable, set the TV to video input.

2 ▼ ▲ (AUTO/FINE TUNING)

Press AUTO/FINE TUNING ▼ and ▲ together for 2 to 3 seconds.

The VCR begins tuning in channels automatically. When all the available channels are tuned in, the channel in programme position 1 is displayed.



To switch programme positions

If the allocation of TV channels to programme positions does not match those on your TV, switch positions as follows.

1 Press PRESET on the VCR.
2 Press PROGRAM +/– to select the programme position you want to switch.
3 Press the number buttons on the remote commander to enter the other programme position.
4 Press EXECUTE on the remote commander.
5 Press PRESET.

Step 6

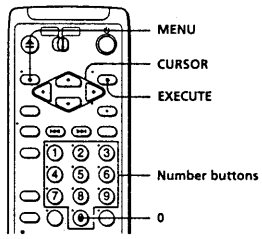
Setting the clock

If the clock has already been set correctly, skip this step.

The date and time are automatically adjusted when the VCR receives PDC broadcast signals. The clock is readjusted at 3:00 AM and 6:00 AM on Sundays.

If the PDC signal is broadcast from outside your time zone, the clock may be set incorrectly.

If the displayed time is different from your local time, turn off the Auto Clock and adjust the clock manually as follows:



1 Make sure a tape is not in your VCR.

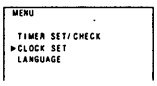
2 Press ERASE on the VCR for about 3 seconds to display "ON" in the display window.

3 Press 0 on the remote commander twice to display "OFF" in the display window.

4 Press ERASE again.

5 MENU, EXECUTE

Press MENU, then select CLOCK SET and press EXECUTE.

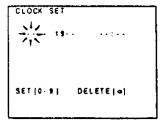


6 ① ② ③ ④ ⑤ ⑥ ⑦ ⑧ ⑨ ⓪

Press the number buttons to set today's day, month and year.

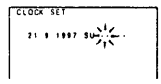
For a single digit number, press the number button 0 before entering the number. The day of the week is set automatically.

If you make a mistake, press CURSOR (♦).



7 ① ② ③ ④ ⑤ ⑥ ⑦ ⑧ ⑨ ⓪

Press the number buttons to set the hour and minute.



8 EXECUTE

Press EXECUTE to start the clock.

The clock starts running from zero seconds.

To adjust to Seasonal Time

1 Press MENU, then select CLOCK SET and press EXECUTE.
2 Press CURSOR (♦/♦) to move the time one hour ahead or behind.
3 Press EXECUTE.

Additional tuning instructions

To improve the picture of a TV channel

1 Press PRESET on the VCR.
2 Press PROGRAM +/– to select the programme position for which you cannot obtain a clear picture.
3 Press AUTO/FINE TUNING (▼/▲) to adjust to the clearest picture.
4 Press PRESET.

To tune in a specific TV channel manually

TV channels with weak signals may not be tuned in automatically. In this case, tune in the channel you want manually.

1 Press PRESET.
2 Press PROGRAM +/– to select the programme position.
3 Press SEARCH. The VCR starts searching for a channel and displays the first one it finds on the TV screen. Press SEARCH repeatedly until the channel you want is displayed.
4 To tune other channels, repeat steps 2 and 3.
5 Press PRESET.

To erase unwanted programme positions

Positions that are erased will be skipped later when you press the PROGRAM +/– buttons.

1 Press PRESET.
2 Press PROGRAM +/– to select the programme position you want to erase.
3 Press ERASE. The indication "S" appears in the display window.
4 To erase other positions, repeat steps 2 and 3.
5 Press PRESET.

To restore an erased position, press ERASE in step 3 so that "S" disappears.

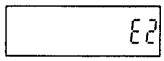
Setting a satellite tuner

If you have a satellite tuner

If you connect a satellite tuner, you can watch or record satellite programmes.

Setting up a tuner and the VCR

1 Connect EURO-AV2 on the VCR to the EURO-AV (Scart) connector on the tuner using the EURO-AV cable (not supplied).
2 Turn on the VCR.
3 Press INPUT SELECT.
"E2" appears in the display window.



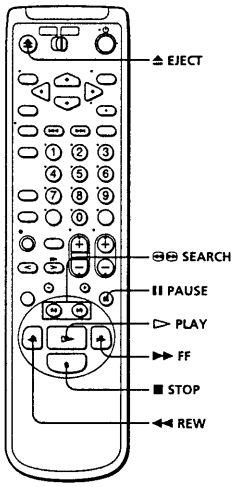
To watch satellite broadcasts

Turn on the TV and set the TV's input to VIDEO. (You don't have to turn on your VCR).

To record satellite broadcasts

When setting the VCR to record, press INPUT SELECT on the remote commander until "E2" appears in the display window.

Playing a tape



1 Turn on your TV and set it to the video channel.

2 Insert a tape.

The VCR turns on automatically. The tape starts playing if its safety tab has been removed.

3 PLAY ▷

Press ▷ PLAY.

When the tape reaches the end, it will rewind automatically.

Additional tasks

To	Press
Stop play	■ STOP
Pause play	II PAUSE
Resume play after pause	II PAUSE or ▷ PLAY
Search forward	⊖ SEARCH during playback
Search backward	⊖ SEARCH during playback
Fast-forward the tape	▶▶ FF during stop
Rewind the tape	◀◀ REW during stop
Eject the tape	⏏ EJECT

To use the Replay function

You can immediately rewind and playback the scene you want to watch again.

During playback, press REPLAY on the remote commander up to four times. The VCR rewinds the tape 10 seconds for each press of the button, and then resumes playback.

To use the tape counter

At the point on the tape that you want to find later, press COUNTER RESET. The counter in the display window resets to "0:00:00." Search for this point afterwards by referring to the counter.

To display the counter on the screen, press DISPLAY.

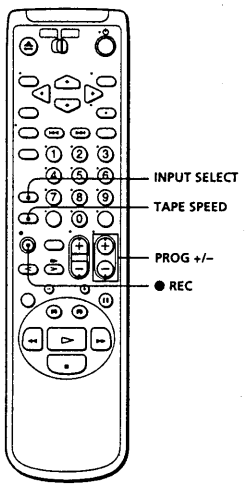
Tip

- You can operate a Sony TV with the remote commander just by switching TV/VIDEO to TV. Buttons marked with a dot (•) double as TV controls.

Notes

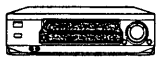
- When you leave the VCR in pause for over five minutes, the VCR automatically switches to playback.
- Tapes recorded in the LP mode on other VCRs can be played back on this VCR but noise may appear on the screen.
- The counter resets to "0:00:00" whenever a tape is reinserted.
- The counter stops counting when it comes to a portion with no recording.
- The counter does not appear on the screen during still mode, slow-motion playback or search.

Recording TV programmes

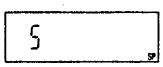


1 Turn on your TV and set it to the video channel.

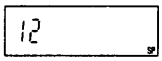
2 Insert a tape.



3 INPUT SELECT — Press INPUT SELECT until a programme position appears in the display window.

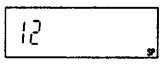


4 ·PROG — Press PROG +/– to select the programme position you want to record.



5 TAPE SPEED — Press TAPE SPEED to select the tape speed, SP or LP.

LP provides recording time twice as long as SP, however, SP produces better picture quality.



6 ●REC — Press ● REC to start recording.

To stop recording

Press ■ STOP.

To watch another TV programme while recording

1 Press TV/VIDEO to turn off the VTR indicator in the display window.
2 If the TV is connected to the VCR's EURO-AV input, set the TV to TV input; if not, skip this step.
3 Select another programme position on the TV.

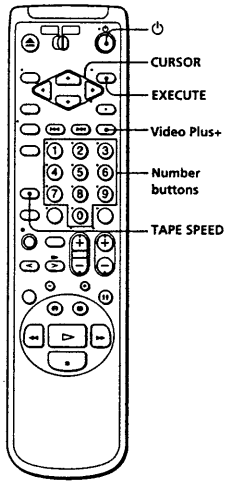
To save a recording

To prevent accidental erasure, break off the safety tab as illustrated. To record on a tape again, cover the tab hole with adhesive tape.

Tips

- To select a programme position, you can use the number buttons on the remote commander. For two-digit numbers, press the -/-- (ten's digit) button followed by the number buttons.
- To record from other equipment connected with a Euro-AV connector, in step 3, press INPUT SELECT to display "E1" in the display window.
- If you don't want to watch TV while recording, you can turn off the TV.

Recording TV programmes using Video Plus+

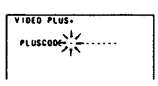


Just enter the programme's "PlusCode" listed in the TV programme guide. The date and times are set automatically. You can preset up to six programmes within a one year time frame.

Before you start

- Turn on your TV and set it to the video channel.
- Insert a tape with its safety tab in place. Make sure the tape is longer than the total recording time.

1 VIDEO Plus+ — Press Video Plus+.

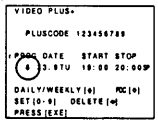


2 ① ② ③ ④ ⑤ ⑥ ⑦ ⑧ ⑨ ⓪ — Press the number buttons to enter the programme's ShowView number, then press EXECUTE.

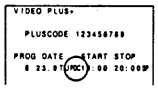
If you make a mistake, press CURSOR (←) and enter the correct number.

3 ① ② ③ ④ ⑤ ⑥ ⑦ ⑧ ⑨ ⓪ — Press the number buttons to set the programme position that corresponds to the TV programme.

- You do not have to set the programme position for the same programme position from the next time.
- If you have changed the preset programme position, press CURSOR (←) and enter the correct number.



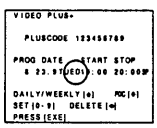
4 CURSOR — Press the CURSOR (↑) buttons to set PDC on or off.



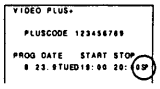
5 CURSOR — Select how often you want to record by pressing CURSOR (↑).

- To record the same programme every day, select ED.
- To record the same programme Monday to Friday, select M-F.
- To record on the same day every week, select WK.

If you want to change the STOP time, press PROG +/– buttons. The time will increase or decrease by 10 minutes for each press the button.



6 TAPE SPEED — Press TAPE SPEED to select SP or LP.



7 EXECUTE — Press EXECUTE.

To preset another programme, repeat steps 2 to 7.

Recording TV programmes using Video Plus+ (continued)

8 Press ⏻ to turn off the VCR.

The ⏲ indicator appears in the display window and the VCR stands by for recording.

To stop recording

Press ■ STOP.

To use the VCR after setting the timer

To use the VCR before a timer recording begins, just press ⏻. The ⏲ indicator turns off and the VCR switches on. Remember to press ⏻ to reset the VCR after using the VCR.

You can also do the following tasks while the VCR is recording:

- Reset the counter.
- Display tape information on the TV screen.
- Check the timer settings.
- Watch another TV programme.

About PDC signals

The broadcast system may transmit PDC (Programme Delivery Control) signals with its TV programmes. These signals ensure that your timer recordings are made regardless of broadcast delays, early starts or broadcast interruptions. When setting the timer, make sure the start time is exactly as indicated in the TV programme guide, otherwise the PDC function will not work.

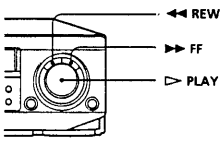
Tip

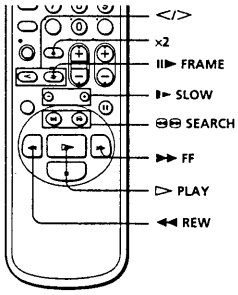
- To cancel the procedure, press Video Plus+ before pressing EXECUTE.

Notes

- When you press Video Plus+, the following menus may appear instead of the Video Plus+ menu:
  - The clock setting menu appears if you need to set the clock.
  - The TIMER SET/CHECK menu appears if you have already set six programmes.
- When recording satellite broadcast programmes, remember to keep the satellite tuner switched on until the VCR finishes recording.

Playing/searching at various speeds





Tip

- Adjust the picture using the TRACKING (STILL ADJUST) ▼/▲ buttons if:
  - Streaks appear while playing in slow motion.
  - The picture shakes while pausing.

Notes

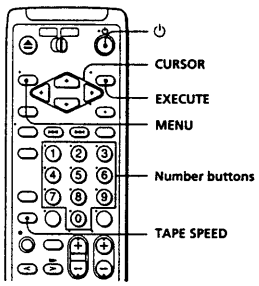
- The sound is muted during these operations.
- Streaks or snow may appear or there may be no colour during these operations.
- If a tape is played in slow motion for over five minutes, the VCR automatically switches to normal playback.

Playback options	Operation
Play at high speed	During playback or pause: • Press ⊖ SEARCH or ⊖ SEARCH, or • Press ▶▶ FF or ◀◀ REW
Fast-forward/rewind	During stop, press ▶▶ FF or ◀◀ REW.
Play at twice the normal speed (SLV-E520UX only)	During playback or pause, press x2. To select the direction, press < (reverse) or > (forward).
View the picture during fast-forward or rewind	During fast-forward, press ▶▶ FF. During rewind, press ◀◀ REW. Press again to resume fast-forward or rewind.
Play in slow motion	During playback or pause, press I▶ SLOW +/–. Press + to increase the speed and – to decrease the speed.
Play frame by frame	During pause, press II▶ FRAME.

To resume normal playback

Press ▷ PLAY.

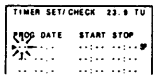
Setting the timer manually



To set the timer manually, follow the instructions below.

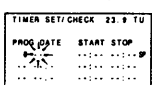
1 Press MENU, then select TIMER SET/CHECK and press EXECUTE.

If the clock needs to be set, the VCR automatically displays the clock setting screen.



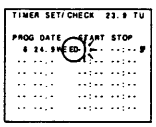
2 Select the programme position by pressing the number buttons.

If you make a mistake, press CURSOR (◆) and enter the correct number.



3 Set the date and month to start recording by pressing the number buttons.

- To record the same programme, press CURSOR (◆) to select ED.
- To record the same programme, Monday to Friday, press CURSOR (◆) to select M-F.
- To record on the same day every week, press CURSOR (◆) to select WK.

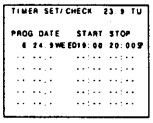


Tips

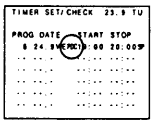
- For a single digit number, press the 0 button before entering the number.
- To record from other equipment connected with a EURO-AV connector, in step 2, press INPUT SELECT to display "E1" or "E2" in the "PROG" position.

continued

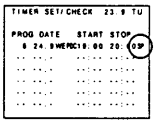
4 Set the times to start and stop recording by pressing the number buttons.



5 Press CURSOR (♦) to set PDC on or off.

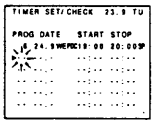


6 Press TAPE SPEED to select the speed, SP or LP.



7 Press EXECUTE.

The cursor (▶) reappears at the top of the next line. To set another timer setting, repeat steps 2 to 7.



8 Press MENU to return to the normal screen, and then press ⏻ to turn off the VCR.

The ⊡ indicator appears in the display window and the VCR stands by for recording.

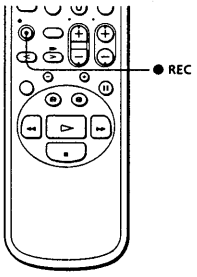
To stop recording

Press ■ STOP.

Notes

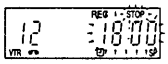
- When the tape reaches the end during recording, recording stops and the VCR turns off.
- The ⊡ indicator on the VCR flashes in the following cases:
  - When you press ⏻ with no tape inserted.
  - When you use the VCR up to five minutes before timer recording starts.

Recording TV programmes using the quick timer



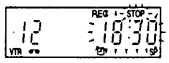
After starting recording in the normal way, you can have the VCR stop recording automatically after a specified duration.

1 While recording, press ● REC twice.



2 Press ● REC repeatedly to set the duration.

Each press advances the time in increments of 30 minutes.



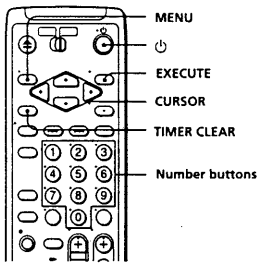
To check or extend the duration

Press ● REC once. The duration is displayed for 10 seconds. If you want to extend the time, press ● REC within the 10 seconds to set to the new duration.

To stop recording

Press ■ STOP.

Checking/ cancelling timer settings



1 Press ⏻ to turn on the VCR.

2 Press MENU, then select TIMER SET/CHECK and press EXECUTE:

- If you want to change or cancel a setting, go to the next step.
- If you want to check a setting and do not need to cancel it, press MENU, then press ⏻ to return to recording standby.

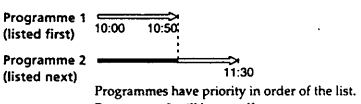
3 Press the CURSOR (♦/♦) buttons to select the setting you want to cancel, then press TIMER CLEAR.

4 Press MENU.

If any settings remain, press ⏻ to return to recording standby.

When the timer settings overlap

The VCR will not record overlapping programmes. If any of your settings overlap, change them.

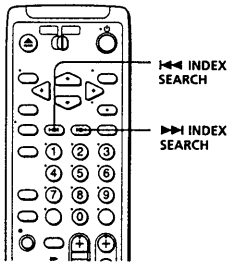


Programmes have priority in order of the list. Programme 2 will be cut off.

Notes

- If the programme with PDC overlaps other programmes without PDC, the programme with PDC has priority. Other programmes will be cut off.
- When changing the setting, cancel it first and then set it again.

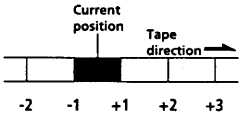
Searching using the index function



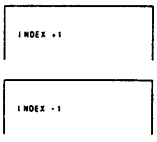
The VCR marks the tape with index signals every time you start to record to help you search for a recording later on.

Press ⏭ INDEX SEARCH to search ahead or ⏮ INDEX SEARCH to search backwards during playback or stop.

By pressing ⏭ INDEX SEARCH or ⏮ INDEX SEARCH repeatedly, you can specify how many index signals ahead or behind the specific index signal is from the current position.



Each time an index signal is detected, the index number decreases by 1. When it reaches "INDEX +1 (or –1)", playback starts automatically.



To stop index search

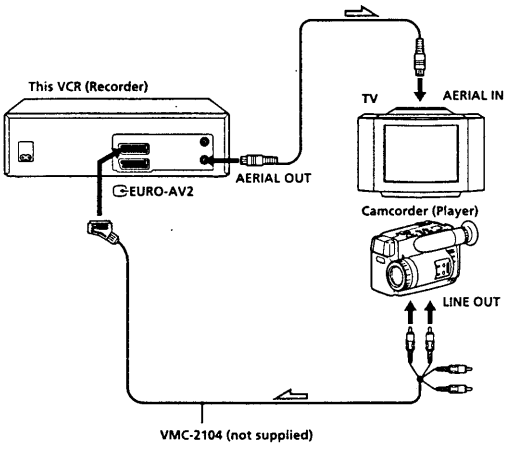
Press ■ STOP.

Tip

- The VCR can search up to 99 index signals ahead or behind the current position.

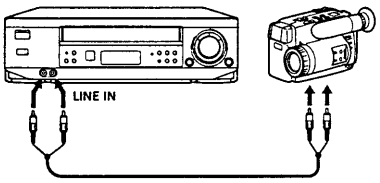
Editing with another VCR

How to hook up to record on this VCR



:Signal flow

You can also connect to the jacks on the front panel.



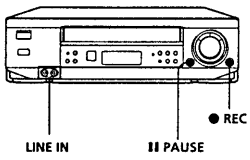
Tips

- To edit more precisely, use the II PAUSE buttons on the VCRs to release pause and start editing.
- To cut out unwanted scenes, press II PAUSE on this VCR when an unwanted scene begins. When it ends, press II PAUSE again to resume recording (Assemble Editing).

Note

- When you leave the VCR in pause for over five minutes, the player automatically switches to playback and this VCR (recorder) automatically switches to stop.

Operation when recording on this VCR



Before you start editing

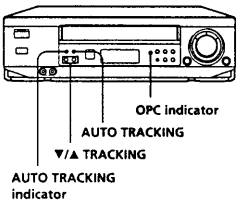
- Press INPUT SELECT to display "E2" in the display window.
- When this VCR is connected to the LINE IN jack on the front panel, press INPUT SELECT to display "L" in the display window.
- Press TAPE SPEED to select the recording tape speed (SP or LP).

1 Insert a source tape into the other (playback) VCR. Search for the point to start playback and set to playback pause.
2 Insert a tape into this (recording) VCR. Search for the point to start recording and press II PAUSE.
3 Press ● REC on this VCR and set it to recording pause.
4 To start editing, press the II PAUSE buttons on both VCRs and release pause.

To stop editing

Press the STOP buttons on both VCRs.

Adjusting the picture



Adjusting the tracking

Although the VCR automatically adjusts the tracking when playing a tape, distortion may occur if the tape was recorded in poor condition. If so, manually adjust the tracking.

Press the ▼/▲ TRACKING buttons to adjust to the clearest picture. If you cannot get a clear picture manually, press the AUTO TRACKING button to return to automatic adjustment. In this case, the AUTO TRACKING indicator flashes.

About "Trilogic Plus" Optimum Picture Control (OPC)

"Trilogic Plus" automatically improves recording and playback quality by adjusting the VCR to the condition of the video heads and tape.

"Trilogic Plus" playback

The "Trilogic Plus" function automatically works on all types of tapes, including rental tapes and tapes that were not recorded with "Trilogic Plus."

"Trilogic Plus" recording

Whenever you insert a tape and first start recording, the VCR adjusts to the tape using the "Trilogic Plus" function (the "Trilogic Plus" indicator on the VCR flashes rapidly). This adjustment is retained until the tape is ejected.

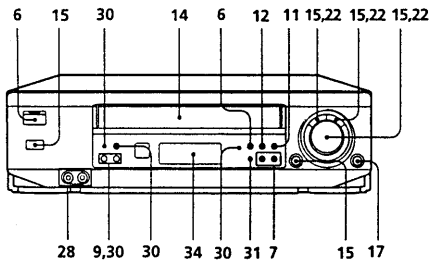
Note

- There is a delay of a few seconds before the VCR actually starts recording while the VCR analyses the tape.

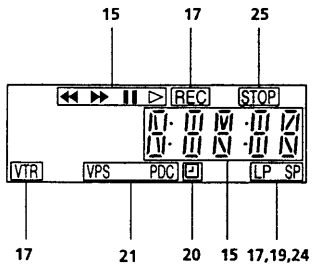
Visual index

Refer to pages indicated for details.

Front panel



Display window



SECTION 2
DISASSEMBLY

1-1. REMOVAL OF CABINET, MECHANISM UNIT, AND MAIN BOARD

REMOVING THE CABINET PARTS (Fig. 1-1-1)

1. Remove the cabinet and bottom cover by removing the four screws ① and four screws ② .
2. Pull out the shuttle knob by fingers together with the button assembly, and remove the front panel by removing the locks of the clamps (A) using a screwdriver. etc., and slightly rotating the bottom part in the direction of the arrow.

Notes: • Electrical adjustments for the this model can be performed with only the cabinet removed.
• When replacing the bottom cover, do not tighten the screws ② too much. Excess tightness may damage the screw taps on the chassis.

REMOVING THE MECHANISM MAIN UNIT AND THE CP-1 PWB ASSEMBLV (Fig.1-1-2 and 1-1-3)

After removing the cabinet parts, remove the mechanism unit and the CP-1 PWB assembly connected as follows.

1. First, remove the red screw ③ of the TB-1 PWB, spread out lock clamps (B) and (C) in the arrow direction slightly and remove TM-1 PWB and TM-2 PWB as shown in Fig. 1-1-2.
2. Remove the screw ④ at the back of the chassis.
3. Remove the red screw ⑤ in the chassis, remove the red screw ⑥, and remove the holder in this order.
4. Remove the two screws ⑦ and two screws ⑧ of the mechanism unit. The two screws ⑧ of the cassette tray can be removed easily by pushing the tray lock lever in the arrow direction to remove the lock as shown in the enlarge view A and by pushing the lid opener lever in the arrow direction to remove the lock as shown in the enlarge view B.
5. Lift up the whole mechanism unit and main board (CP-1 PWB assembly), and as shown in Fig. 1-1-3. push the two lock clamps (D) of the chassis i n the arrow direction so that they can be removed from the chassis.

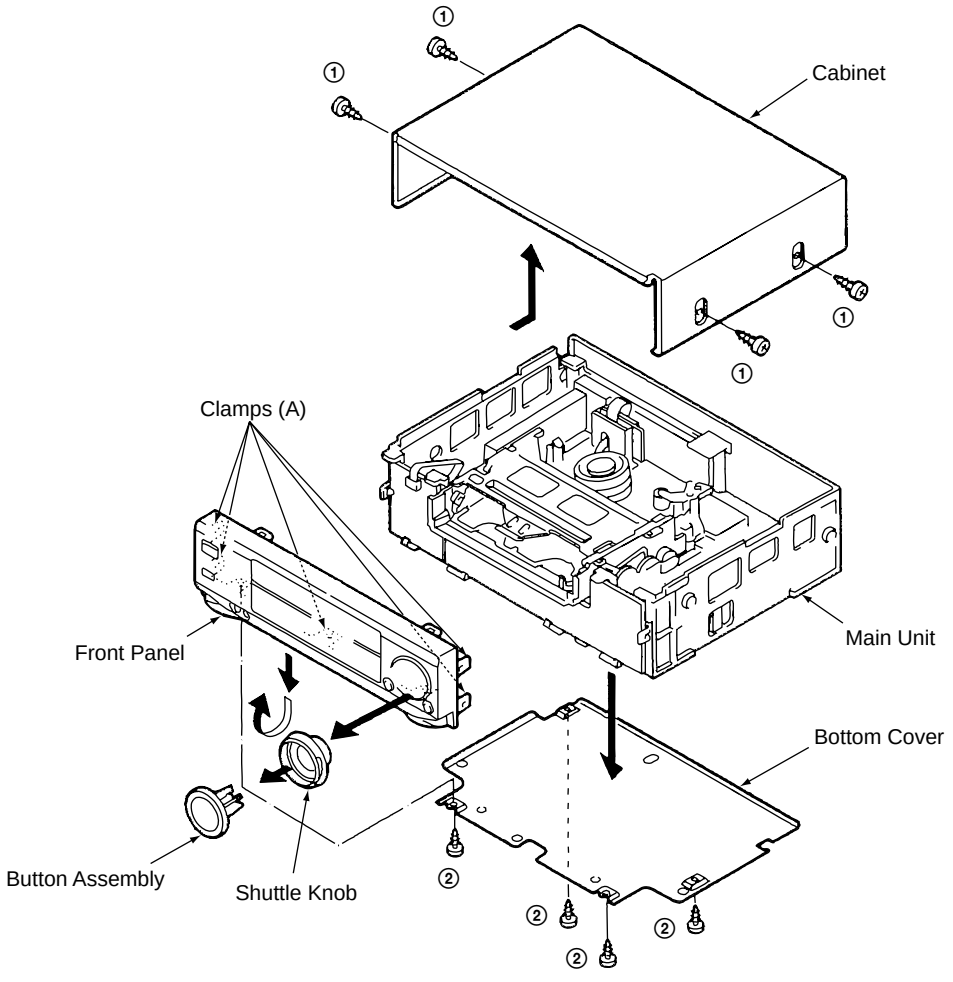


Fig. 1-1-1

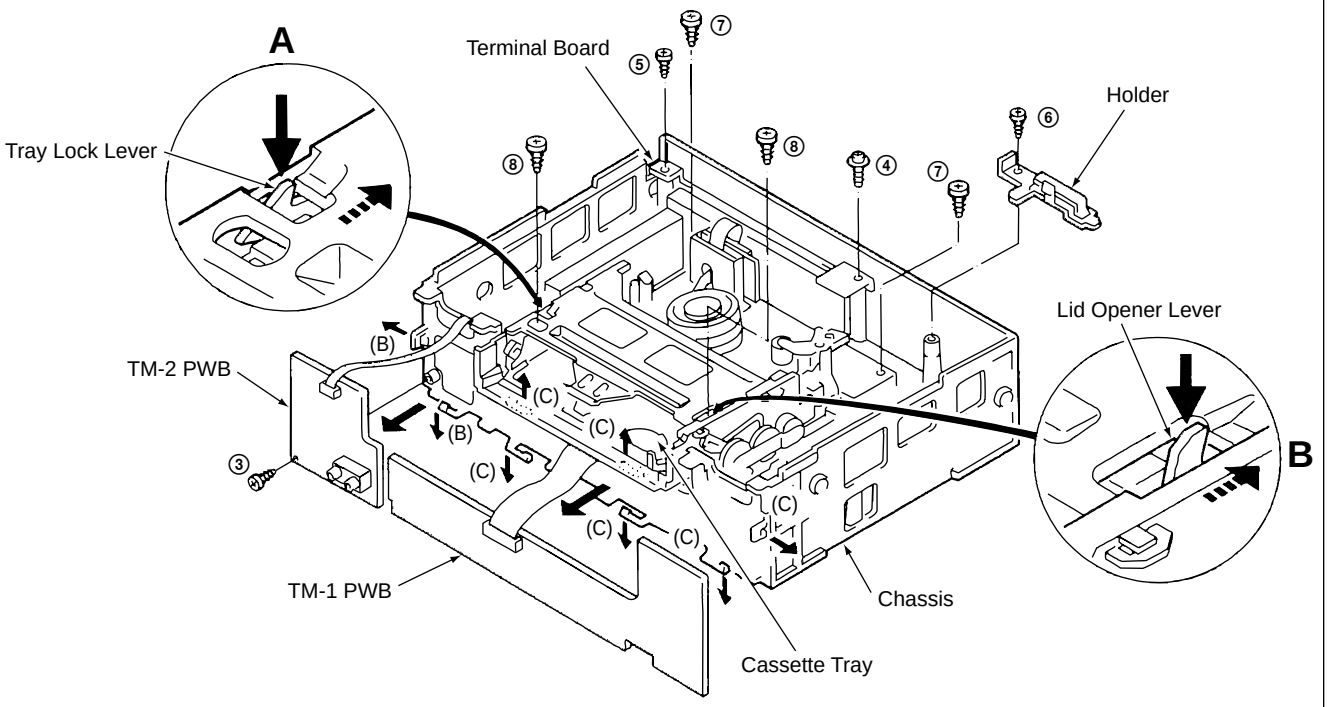


Fig. 1-1-2

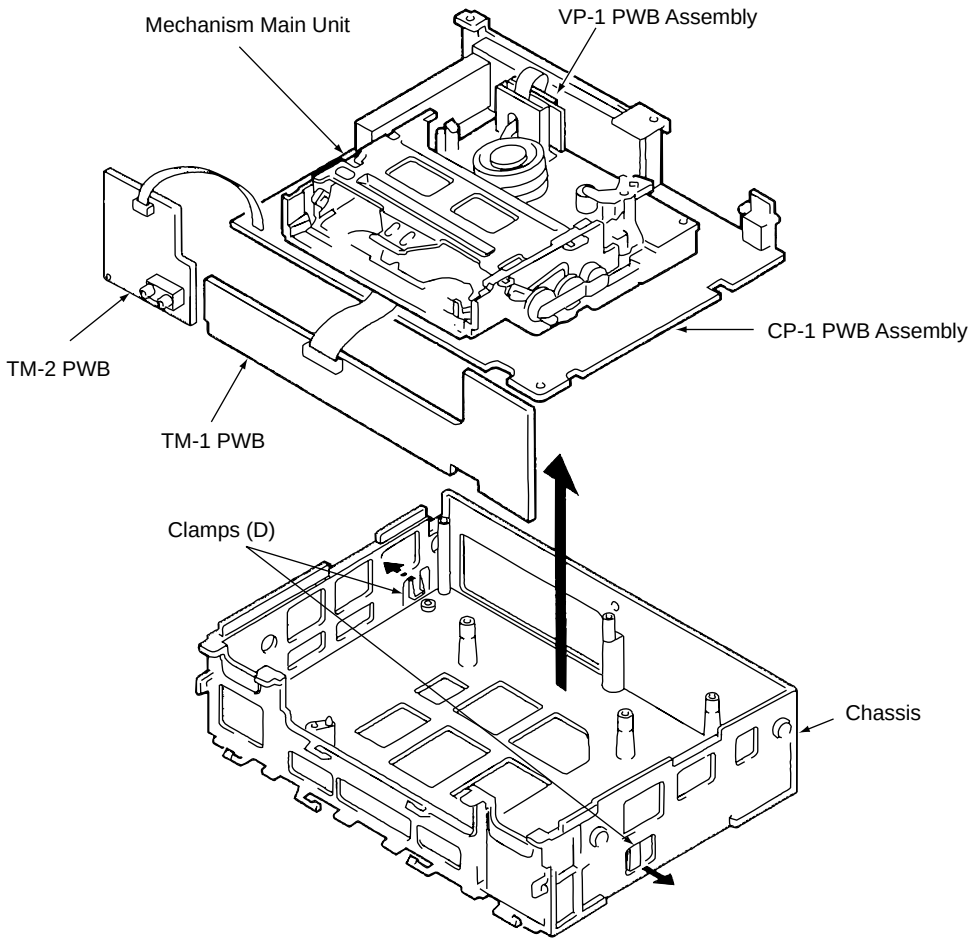


Fig. 1-1-3

1-2. TEMPORARILY SETTING UP AND CONNECTING CP-1 PWB ASSEMBLY

The following is an example of how to place and connect the main board without a jig, when repairing the CP-1 PWB assembly.

1. Place the mechanism unit and main board up side down as a whole on a flat surface with the foil side of the main board facing up.
2. Operate the unit using the buttons on TM-1 PWB or the remote control.

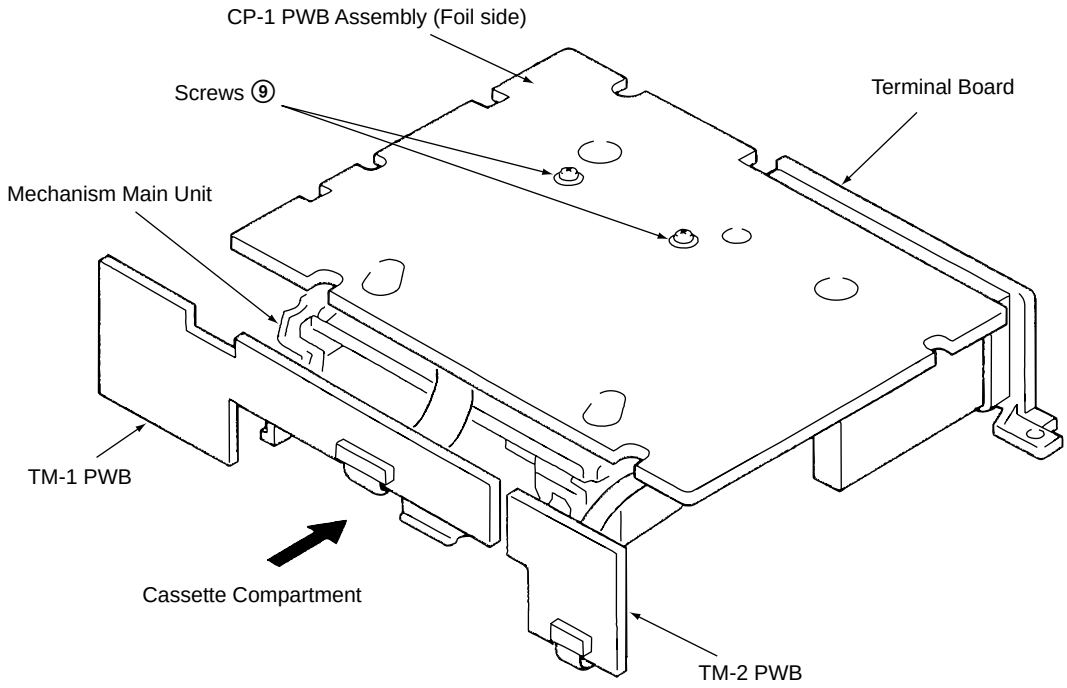


Fig. 1-1-4

1-3. INSTALLATION OF THE FRONT PANEL

When installing the front panel to the chassis after repaires and adjustments.

1.Pressing down the door opener lever of the mechanism main unit.
2. Set the cassette door to half-opened state as shown in Fig. 1-1-5, and install the front panel to the chassis.

Note: Opened cassette door position does not install the front panel to the chassis.

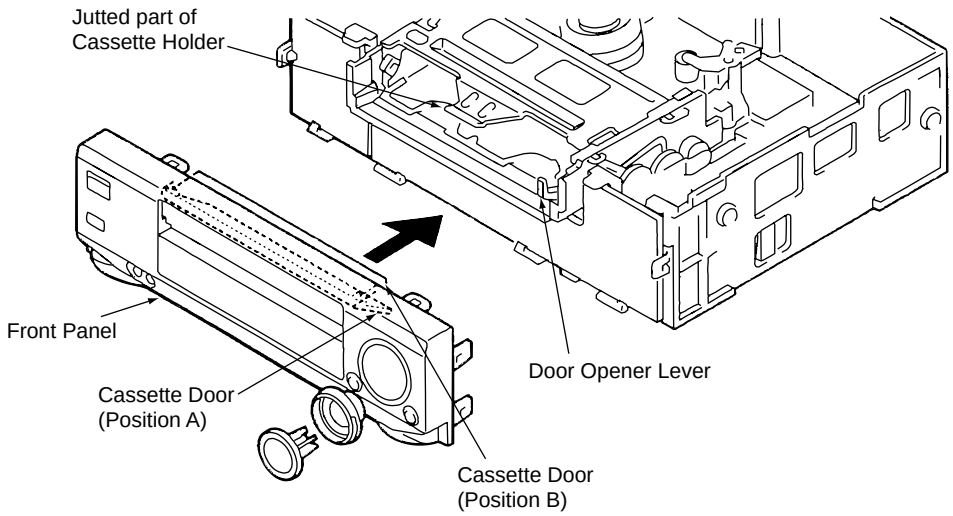
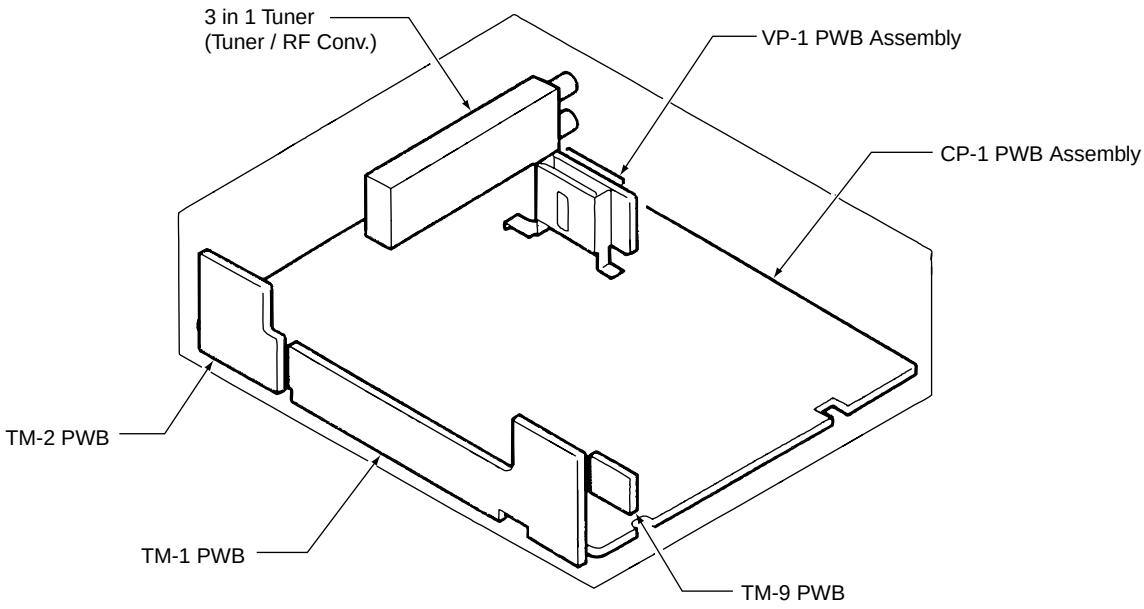


Fig. 1-1-5

SECTION 3
DIAGRAMS

CIRCUIT BOARDS LOCATION



SECTION 5
ADJUSTMENTS

1. MAINTAINING AND CHECKING THE MECHANISM

1-1. REGULAR CHECKS AND MAINTENANCE ITEMS

To obtain full function and maximum performance from the set, and to stop it getting dirty or scratched, we recommend that you carry out the following maintenance procedures and regular checks. The maintenance checks described in the following section should also be carried out without fail after carrying out any repairs to the set.

NOTE: OIL AND GREASE

- Always use the specified brands of oil and grease. If you use a grease with the wrong viscosity, for example, this can lead to all sorts of problems. Be careful to keep the oil and grease free of dust and foreign bodies.
- A “drop” of oil is the amount of oil remaining on the tip of a rod with a diameter of 1.5mm after it is dipped in oil to a depth of 1cm and then taken out.

1-1-1. REGULAR CHECKS

○ Clean ◎ Check △ Oil

Part maintained \ Hours of use (H)		500	1000	1500	2000	2500	3000	3500	4000	4500	5000	Remarks
Tape path system	Tape guide	○	○	○	○	○	○	○	○	○	○	
	ACE head, full erase head	○	○	○	○	○	○	○	○	○	○	
	Cylinder (drum)	○	○ (◎)	○ (◎)	○ (◎)	○ (◎)	○ (◎)	○ (◎)	○ (◎)	○ (◎)	○ (◎)	The life of parts varies enormously, depending on the environment in which the part is used.
	Cleaner roller assembly		◎		◎		◎		◎		◎	
	Pinch roller	○	○	○	○	○	○	○	○	○	○	
Drive system	Reel table		○		○△		○		○△		○	
	Reel belt	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	
	Relay gear, Pulley shaft, Gear shaft		△		△		△		△		△	
	Loading motor		◎		◎		◎		◎		◎	
Perform-ance checks	Back tension		◎		◎		◎		◎		◎	Playback tension torque: 30 to 50g/cm
	Brake system		◎		◎		◎		◎		◎	
	FWD, REW, PLAY torque, REV torque		◎		◎		◎		◎		◎	FWD: 600g/cm or over REW: 600g/cm or over PLAY (SP mode): 80 to l 40g/cm REV: 120 to 220g/cm

1-1-2. CLEANING

1. Cylinder (Drum) (See Fig.1-1-1)

Moisten a chamois with methyl alcohol and clean the video head (including the Hi-Fi audio head) and the tape path surface of the cylinder. Be sure to wipe horizontally in relation to the video head. If you wipe vertically, or use excessive force, you can damage the video head.

2. Tape Path System / Reel Drive System

Clean the pinch roller, the capstan shaft, the tape guides, the FE head, the ACE head, the reel table, the pulley and the reel belt with a soft cloth, or chamois, moistened with methyl alcohol.

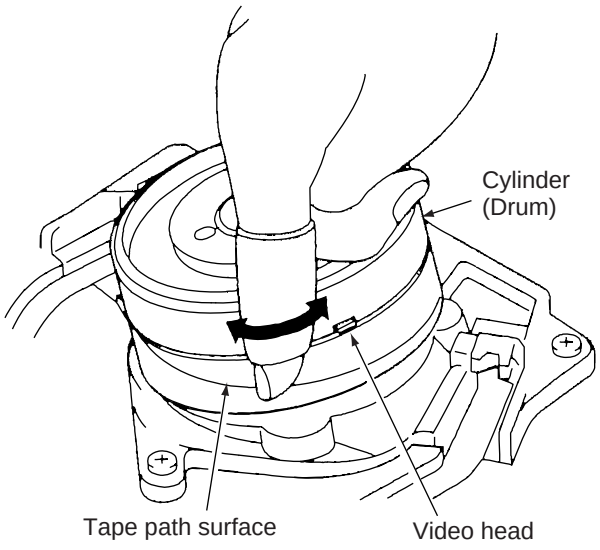


Fig.1-1-1

1-2. SERVICE TOOLS

1-2-1. SERVICE TOOLS

NOTES ON ALIGNMENT TAPES

Select a PAL or NTSC alignment tape from the list below, according to the transmission system of the VCR you are repairing.
PAL: For models with 625 scanning lines and a field frequency of 50Hz
NTSC: For models with 525 scanning lines and a field frequency of 60Hz

No.	Tool	Tool No.		Remarks
		NTSC	PAL	
1	Alignment tape	VHJ-0005	VHJ-0008	SP colour bar 1kHz (normal)
2	Alignment tape	VHJ-0006	VHJ-0009	SP monoscope 7kHz (normal)
3	Alignment tape	VHJ-0007	————	EP monoscope
4	Alignment tape	————	VHJ-0052	LP monoscope
5	Eccentric screw driver	VHJ-0003		Used to adjust the tape path
6	Nut box	VHJ-0048		Used to adjust the height of the lever load assembly
7	Torque dial gauge	VHJ-0004		Used to measure reel winding torque
8	Cassette torque meter	VHJ-0016		Used to measure back tension torque
9	Load lever assembly height adjustment tool	VHJ-0102		Used to adjust the height of the load lever assembly
10	Torque gauge screwdriver	VHJ-0014		Used to adjust the tightening torque of screws
11	3 mm dia. bit for torque screwdriver	VHJ-0045		Used to replace the bit of the torque gauge screwdriver
12	Video head removing tool	VHJ-0041		Used to remove the upper cylinder
13	Oil	VHJ-0099		
14	Grease	VHJ-0100		
15	Grease	VHJ-0101		
16	Relay cables	VHJ-0106		Relay cables of mechanism and CP-1 PWB assembly

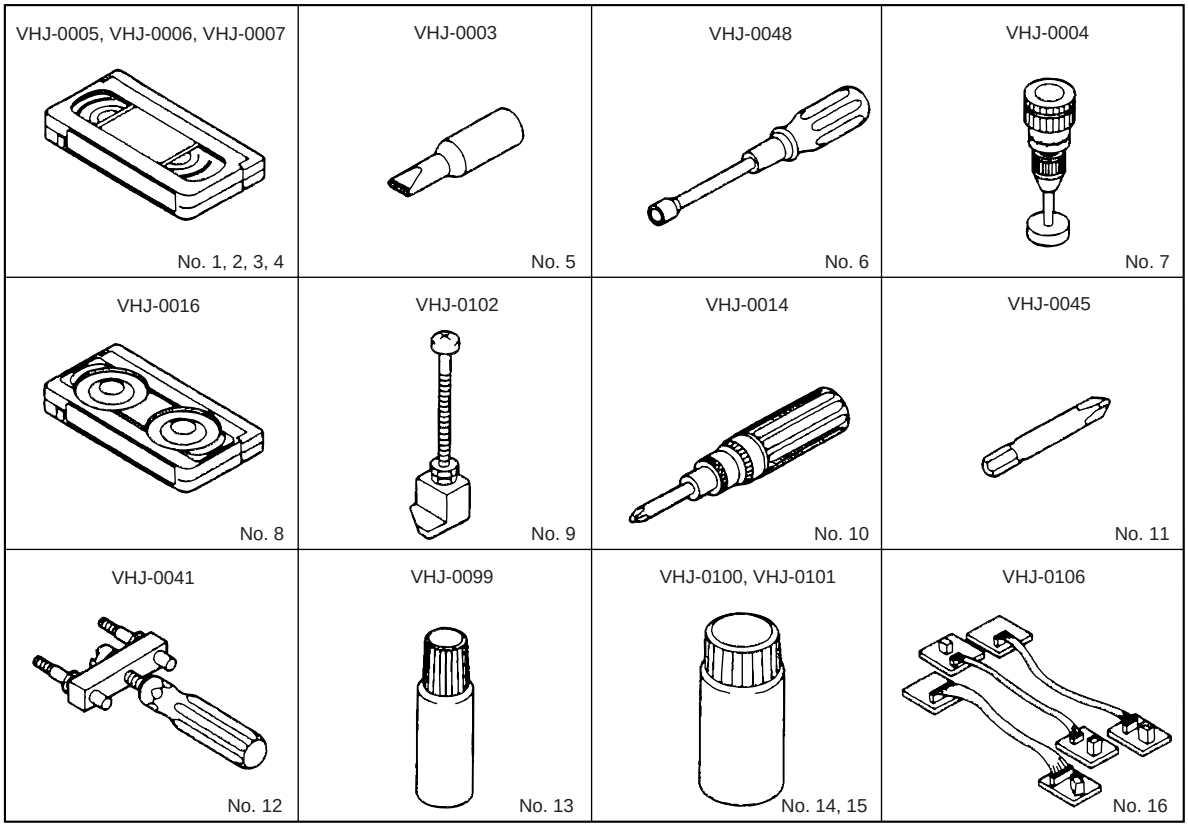


Fig.1-2-1

1-2-2. Using the Relay Cable (VHJ-0106)

The mechanism can be repaired without using the relay cable (VHJ-0106). As shown in Fig. 1-3-1, the relay cable (VHJ-0106) is a tool used for relay between the CP-1 PWB assembly and mechanism unit.
When connecting it, take note of the pin number of the connector.

NOTE 1: Do not place the mechanism upright as shown in Fig. 1-3-1 when inserting/ejecting the cassette.
NOTE 2: For NTSC models, be sure to connect the VM-1 PWB assembly and CP-1 PWB assembly.

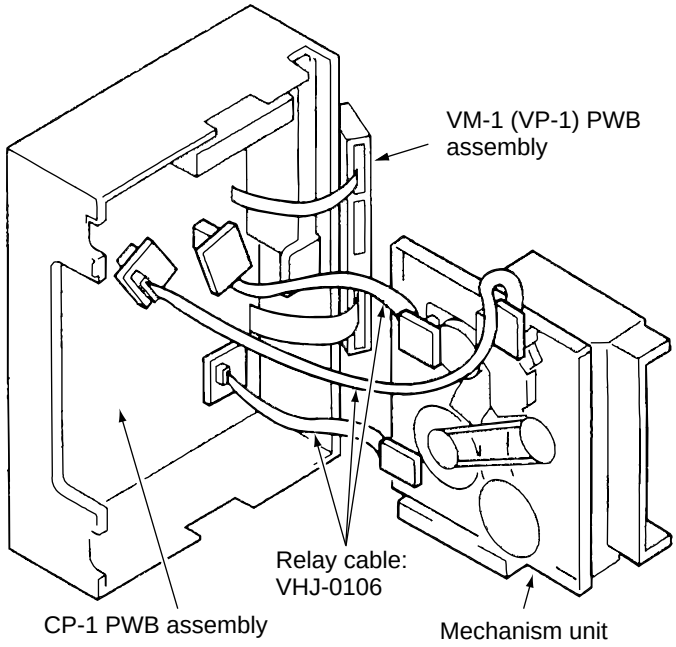


Fig. 1-2-2

2. AN OVERVIEW OF THE MECHANISM

2-1. NAMES OF THE MAIN PARTS

2-1-1. CASSETTE MECHANISM ASSEMBLY

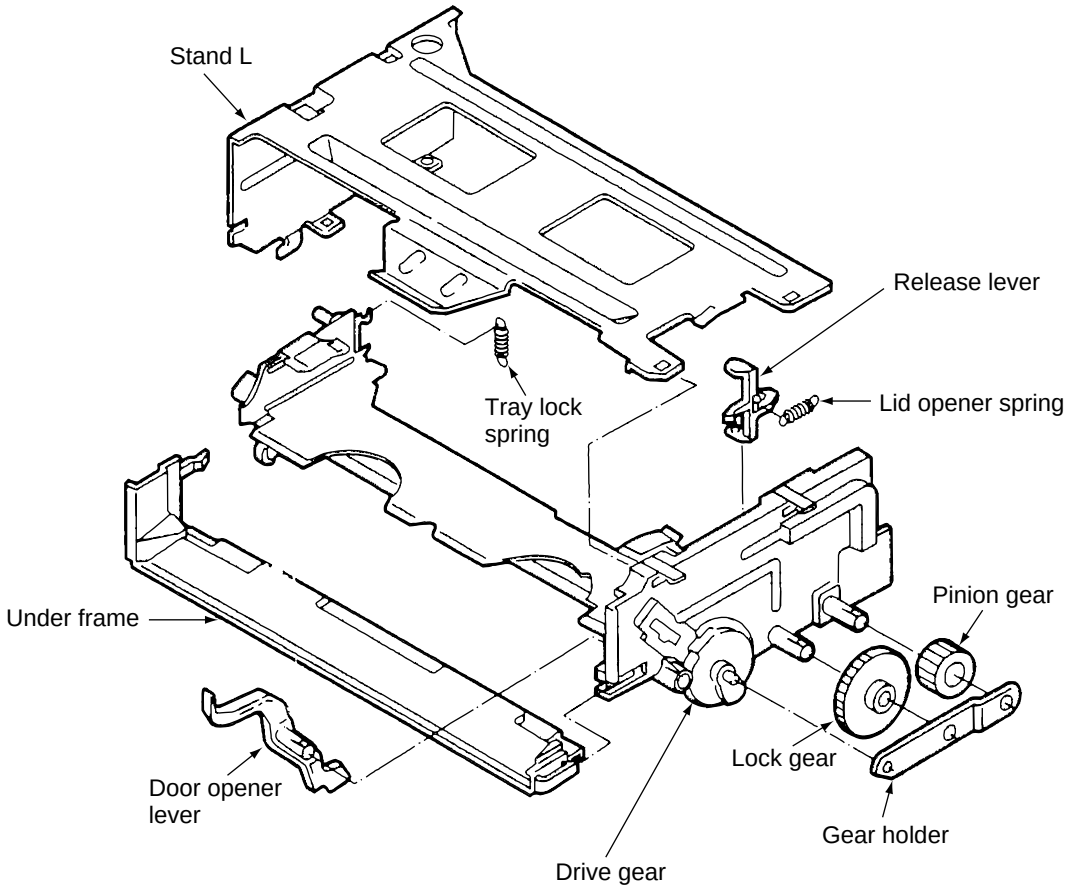


Fig. 2-1-1

2-1-2. TOPVIEW

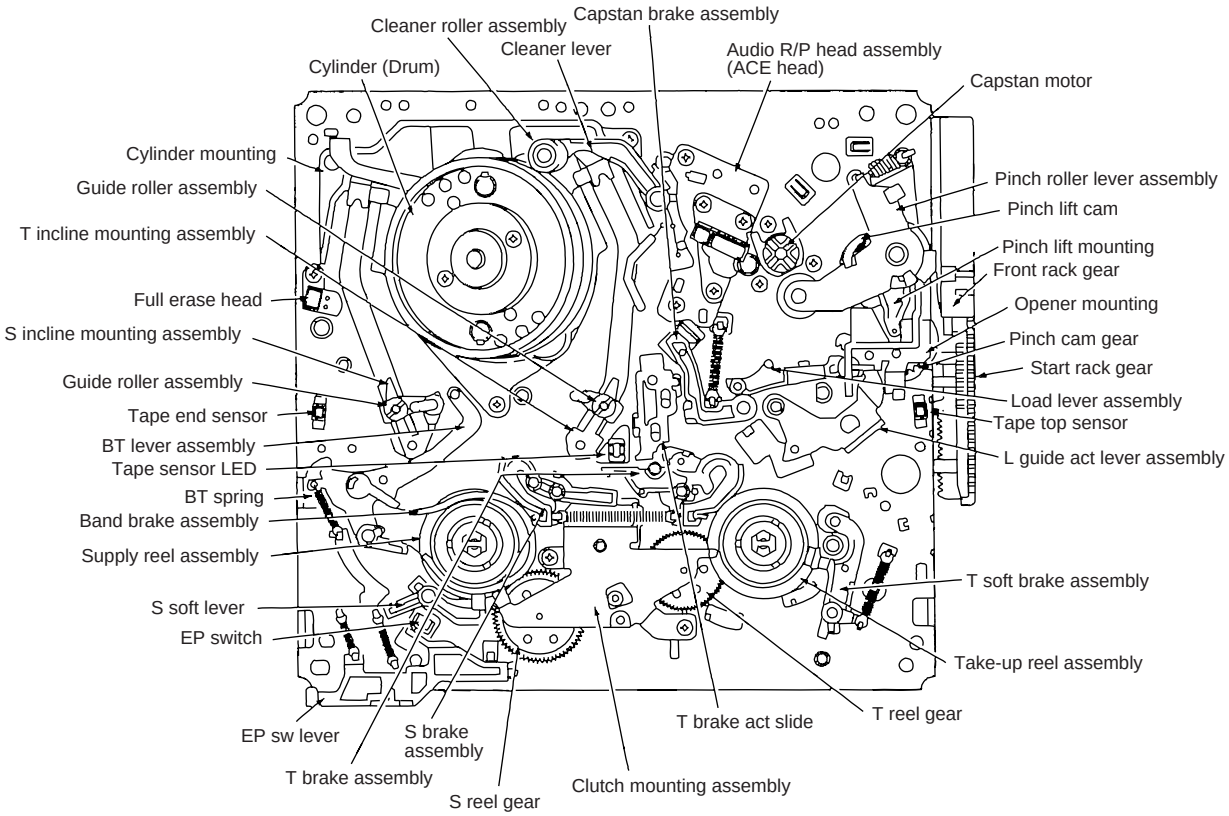


Fig. 2-1-2

2-1-3. UNDERSIDE

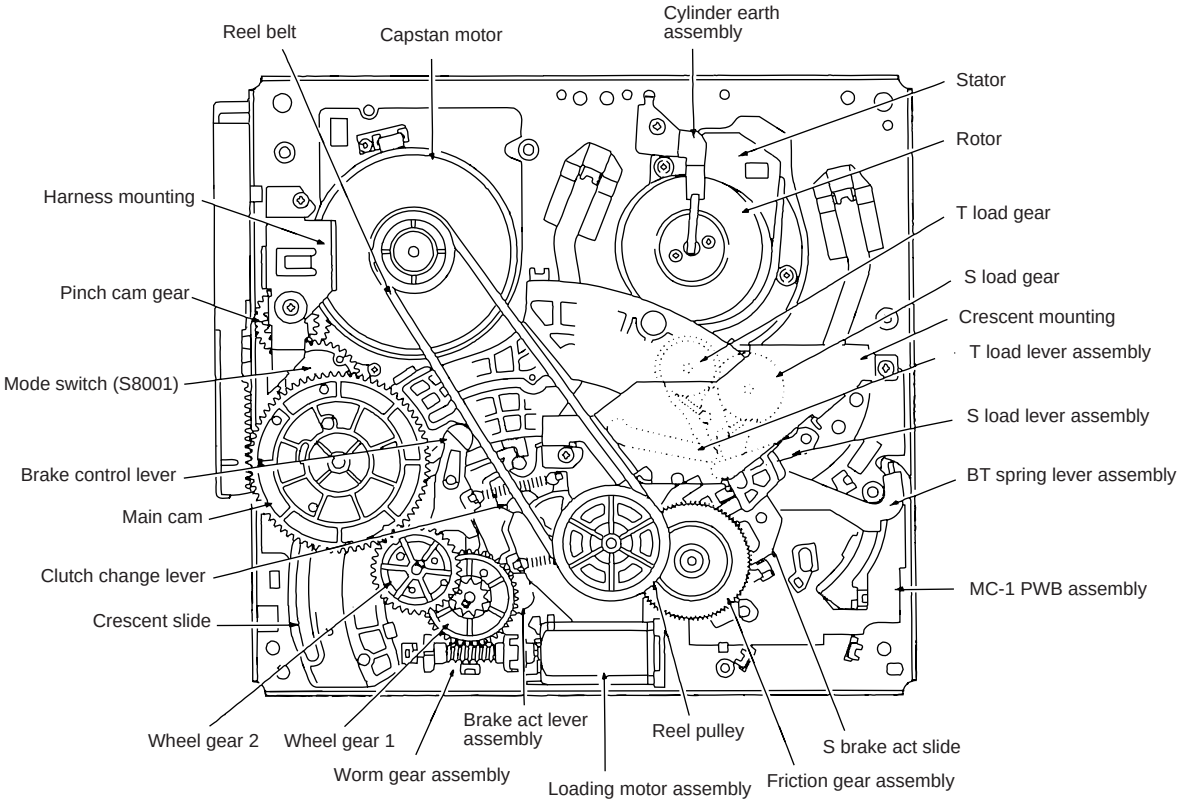
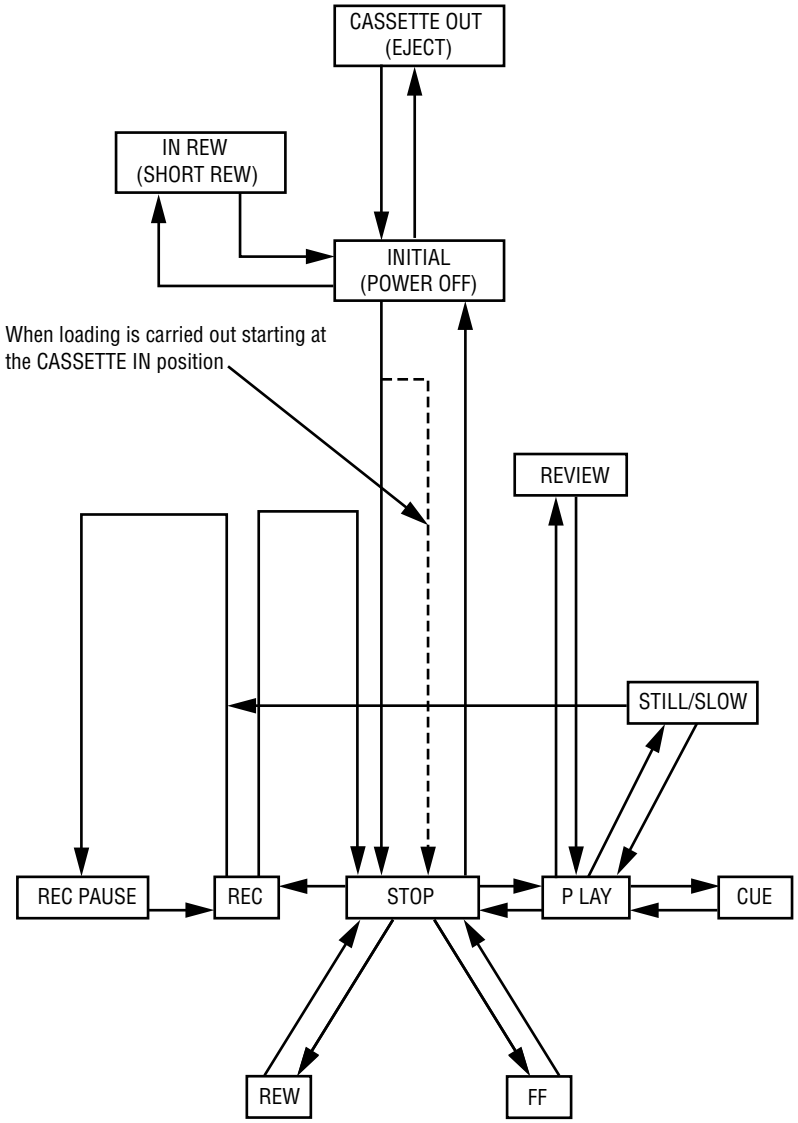


Fig. 2-1-3

2-2. AN OVERVIEW OF THE MECHANISM MODES

2-2-1 . MECHANISM MODE SWITCHING TABLE

NOTE: The letters and figures enclosed in circles in the mechanism mode column are the codes on the crescent slide.

HEX DATA	Mechanism mode	The principal mode-switching states of the mechanism
6	EJECT Ⓔ Distinguished by whether the EP switch is ON or OFF. Horizontal shift section. Vertical shift section.	
2		
	IN REW Ⓡ	
0		
7	INITIAL ⑦	
0	Cleaner roller assembly: ON S/T mounting incline assembly pressure begins.	
1		
0	S/T mounting incline assembly pressure ends.	
1		
	REVIEW ①	
0		
2	IDLER pos. ② (Pinch roller OFF)	
0		
3	STILL/SLOW ③	
0		
5	PLAY/STOP ⑤	
0		
4	BRAKE pos. ④	
0		
6	FF/REW ⑥	

MODE SWITCH OUTPUT TABLE

HEX DATA	SW DATA 1	SW DATA X	SW DATA Y	SW DATA 2 Z	SW DATA 2
0	5.0V	H	H	H	5V
1	5.0V	H	H	L	0V
2	2.5V	H	L	H	5V
3	2.5V	H	L	L	0V
4	3.4V	L	H	H	5V
5	3.4V	L	H	L	0V
6	2.0V	L	L	H	5V
7	2.0V	L	L	L	0V

APPEARANCE OF MODE SWITCH AND RELATIONSHIP BETWEEN MODE POSITIONS

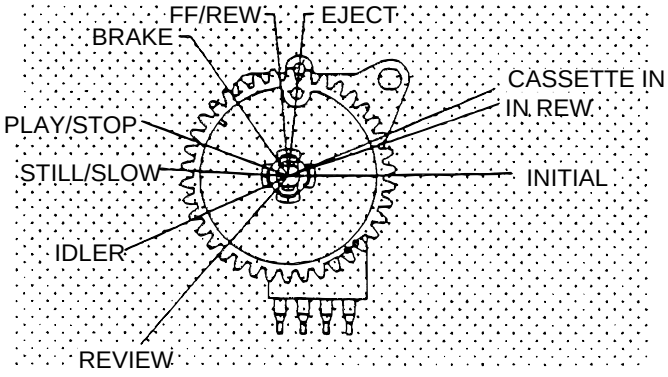


Fig. 2-2-1

2-2-2. MOVEMENT CHECK LIST FOR THE MAIN PARTS OF THE MECHANISM

(S): Strength (W): Weakness

Mechanism mode / Principal parts	EJECT	IN REW	INITIAL (POWER OFF)	(LOADING)	(UNLOADING)	REV	IDLER	STILL/SLOW	PLAY/STOP	BRAKE	FF/REW	
T brake assembly	OFF	OFF	ON	ON	ON	OFF	OFF	OFF	OFF	ON	ON/OFF	
S brake assembly	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	ON	ON/OFF	
T soft brake assembly	OFF	OFF	OFF	ON	ON	ON	ON	OFF	OFF	OFF	OFF	
S soft lever	ON	ON	ON	ON	ON	OFF	OFF	OFF	OFF	OFF	OFF	
BT lever assembly	OFF	OFF	OFF	OFF	OFF	ON	ON	ON	ON	ON	ON	
BT spring	OFF	OFF	OFF	OFF	OFF	ON(W)	ON(W)	ON(S)	ON(S)	ON(S)	ON(W)	
Pinch roller lever assembly	UP	UP	UP	UP/ DOWN	DOWN/ UP	ON	OFF	ON	ON	OFF	OFF	
Clutch mounting assembly	PLAY	PLAY	PLAY	PLAY	PLAY	PLAY	PLAY	PLAY	PLAY	PLAY	FF	
Load lever assembly	UNLO	UNLO	UNLO	LO	LO	LO	LO	LO	L	LO	LO	
Capstan brake assembly	OFF	OFF	OFF	OFF	OFF	OFF	OFF	ON	OFF	OFF	OFF	
S and T incline mounting assembly				LO	UNLO							
Cleaner roller assembly	OFF	OFF	OFF	(ON)	(ON)	OFF	OFF	OFF	OFF	OFF	OFF	

2-2-3. HOW TO CHECK THE MECHANISM MODE POSITION

You can tell which mode the mechanism is currently in by looking at the codes and marking-lines on the crescent slide on the underside of the mechanism chassis. The edge of the crescent mounting is used as the reference line, as shown in Fig.2-2-2, and the marking-lines and symbols indicating the mechanism modes are displayed on the crescent slide, which slides against the edge of the crescent mounting. The mechanism mode is read off from the marking-line on the slide crescent which is aligned with the reference-line on the crescent mounting.
Example: In Fig.2-2-2, marking-line 6 is aligned with the reference-line on the crescent mounting , so the mechanism is seen to be in FF/REW mode.

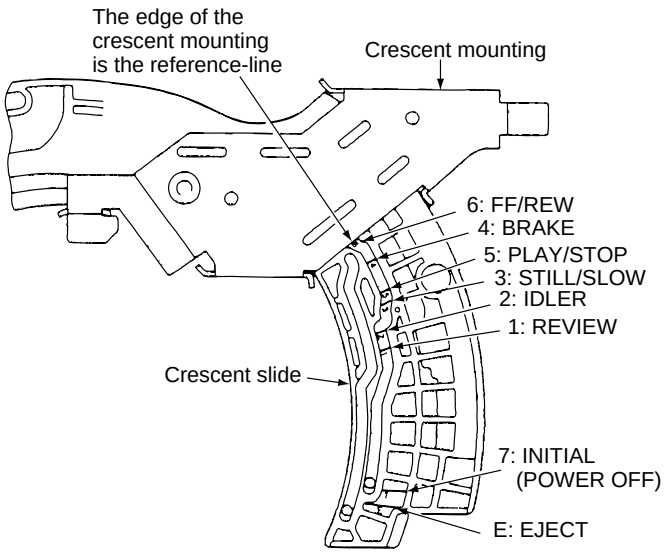


Fig. 2-2-2

2-2-4. SELF-DIAGNOSIS DISPLAY

Some models are equipped with the SELF-DIAGNOSIS DISPLAYS function.
Use it as a means of finding out the symptoms and cause of the error before performing repairs.
For details, refer to the separate service manual for the respective models.

3. DISASSEMBLING THE MAIN PARTS OF THE MECHANISM

POINTS TO NOTE

- When fitting the parts of the mechanism, refer to the "Assembly Notes", and proceed in the reverse of dis-assembly order.
- Dis-assembly and assembly should be carried out in EJECT mode unless a movement mode is explicitly specified. EJECT mode is the state in which the cassette tape has been ejected.
- Clamps are used to prevent parts coming loose. When removing a clamp, be careful not to force it, as this can result in damage.

3-1. HOW TO MAKE THE MECHANISM MOVE

In order to check a movement such as front loading, front unloading, tape loading, tape unloading, raising/lowering and pressing the pinch roller, you will need to operate the loading motor. There are two methods of operating the loading motor, and these are explained in sections 3-1-1 and 3-1-2. The above movements can also be performed without operating the loading motor, by following the method explained in section 3-1-3.

3-1-1. HOW TO OPERATE THE LOADING MOTOR USING A DC VOLTAGE SUPPLY (See Fig.3-1-1)

1) Remove the power plug from the socket.
2) Remove the top cover, front cabinet assembly and bottom cover.
3) Supply a DC voltage in the range 5V between the MOTOR (+) wire and the MOTOR (–) wire on the CP-1 PWB assembly. To make the loading motor rotate in the PLAY or FF/REW direction, the positive terminal should be connected to the MOTOR (+) wire, and the negative terminal to the MOTOR (–) wire. To make it rotate in the EJECT direction, connect the positive terminal to the MOTOR (–) wire, and the negative terminal to the MOTOR (+) wire.
   When rotating the loading motor in the E JECT direction with a tape slacken, stop the rotation of the loading motor before beginning front unloading.
   Rotate the capstan motor with your hand, wind the slacked part of the tape, and rotate the loading motor in the EJECT direction again.

NOTE 1: When carrying out front loading, release the lock by pressing down the tray lock lever ⑧ and the lid opener lever ⑨ of the cassette mechanism assembly (shown in Fig. 3-2-2) in the direction of the arrow.

NOTE 2: When the loading motor stops rotating, following the completion of an operation such as tape loading or front unloading, switch off the DC voltage supply.

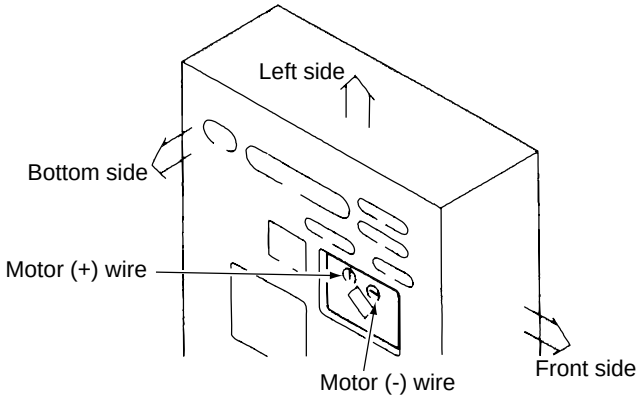


Fig. 3-1-1

3-1-2. OPERATING THE LOADING MOTOR BY THE MANUAL METHOD (See Fig. 3-1-2)

1) Refer to section 3-2 and install the mechanism unit.
2) Using your finger, turn the loading motor located at the rear of the mechanism unit. For EJECT, turn the loading motor in the direction of the arrow on the loading motor. For PLAY or FF/REW, turn it in the opposite direction. When rotating the loading motor in the EJECT direction with a tape slacken, stop the rotation of the loading motor before beginning front unloading.
   Rotate the capstan motor with your hand, wind the slacked part of the tape, and rotate the loading motor in the EJECT direction again.
   When carrying out front loading, release the lock by pressing down the tray lock lever ⑧ and the lid opener lever ⑨ of the cassette mechanism assembly (shown in Fig. 3-2-2).

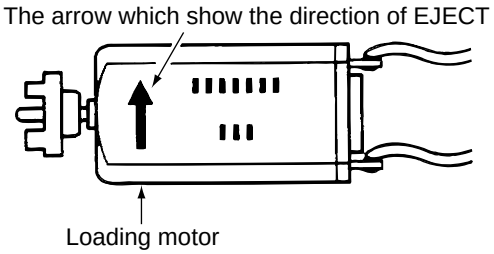


Fig. 3-1-2

3-1-3. MAKING THE MECHANISM MOVE USING THE MANUAL METHOD

1) Refer to section 3-2 and remove the mechanism unit.
2) Refer to section 3-15 and remove the gear wheel 2.
3) If you turn the main cam anticlockwise, the mechanism will switch to a mode such as PLAY or FF/REW. To switch from FF/REW mode to EJECT mode, turn the main cam clockwise.

3-2. MECHANISM UNIT
(See Figs. 3-2-1 and 3-2-2)

1) Remove the top cover, bottom cover and front cabinet assembly.
2) Unplug the flat cable ① from the VM-1/VP-1 PWB assembly on the cylinder (drum), and unplug the ACE head connector ③.
3) Remove the screw ②, the two screws ④, then remove the VM-1/VP-1 PWB assembly ⑤, lifting it upwards. The shape of the VM-1/VP-1 PWB assembly and the bracket varies according to the model.
4) Remove the four screws ⑥ and the two screws ⑩, then lift up the mechanism unit. The tray ⑦ will stop you removing the two screws ⑥ on the front, so release the lock by pressing down the tray lock lever ⑧ and the lid opener lever ⑨ shown in Fig. 3-2-2, then slide off the tray ⑦. Move the tray by referring to section 3-1 and turn the loading motor in the PLAY direction.

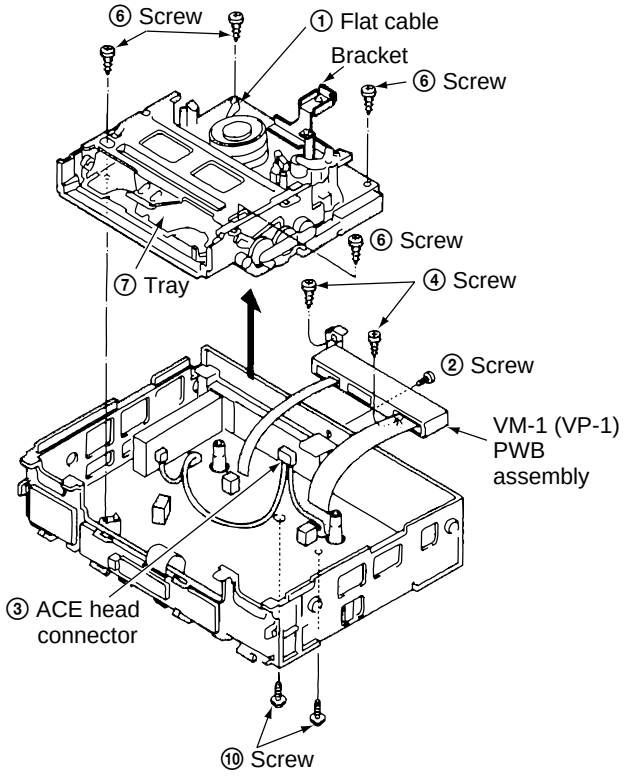


Fig.3-2-1

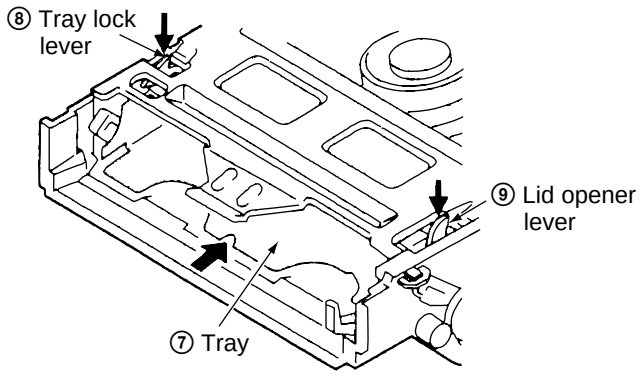


Fig.3-2-2

3-3.CASSETTE DRIVE MECHANISM

3-3-1 . CASSETTE MECHANISM ASSEMBLY
(See Figs.3-3-1 and 3-3-2)

1) Put the VCR into EJECT mode.
2) Remove the two screws ①.
3) Lift up the back of the cassette mechanism assembly ② slightly, and remove the two hooks ③ on the front.

ASSEMBLY NOTES:

1. The cassette mechanism assembly and the mechanism chassis should both be fitted in EJECT mode.
2. Check that the two hooks ③ have snapped into the mechanism chassis, and make sure that the two holes ④ in the cassette mechanism assembly are aligned with the two dowels ⑤ on the mechanism chassis.
3. Make sure that the big tooth on the pinion gear of the cassette mechanism assembly slots properly into the deepest gap in the start rack gear, as shown in Fig. 3-3-2.
4. When fitting the two screws ①, use the torque gauge screwdriver (VHJ-0014). Give the screws a tightening torque of 5 kg/cm.

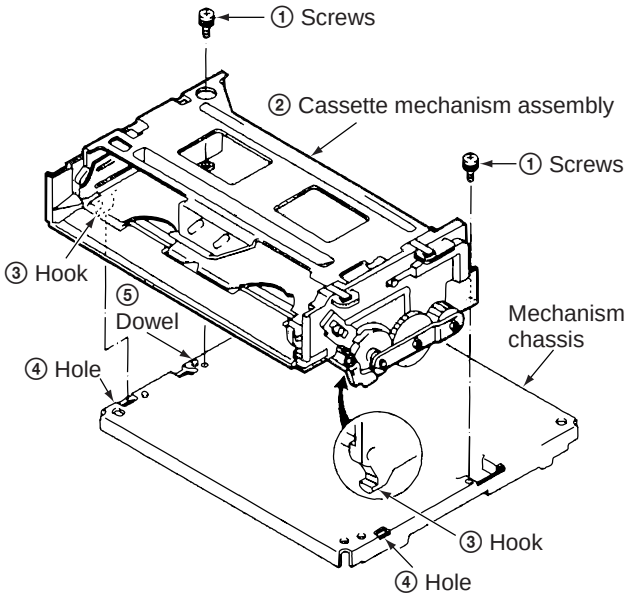


Fig.3-3-1

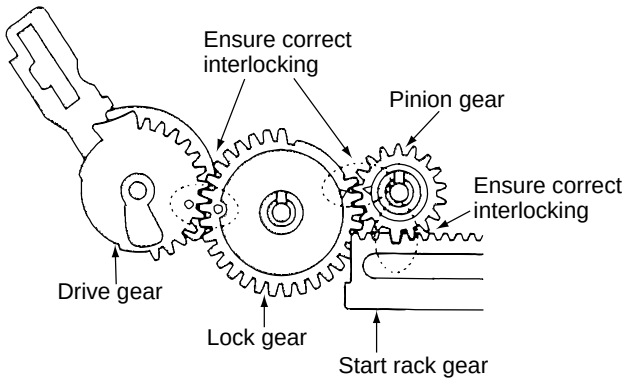


Fig. 3-3-2

3-3-2. CASSETTE DRIVE GEAR (See Fig. 3-3-3)

1) Refer to section 3-3-1 and remove the cassette mechanism assembly.
2) Remove clamps ① and ②, then remove the gear holder ③.
3) Remove the clamp ①, then remove the pinion gear ④.
4) Remove the clamp ②, then remove the lockgear ⑤.

ASSEMBLY NOTES:

1. Put the tray in the EJECT mode position before fitting any parts.
2. Apply grease (VHJ-0100) to the gear mounting shafts, all the gear teeth, and the cam part of the drive gear ⑥.
3. Ensure that the drive gear, the lock gear and the pinion gear interlock correctly, as shown in Fig. 3-3-2.
4. Make sure the clamps ① and ② snap in to the gear holder ③.

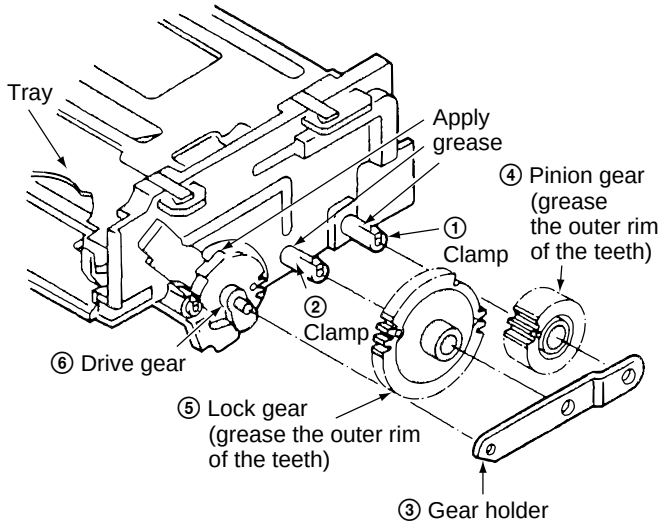

Tray
Apply grease
④ Pinion gear (grease the outer rim of the teeth)
① Clamp
② Clamp
⑥ Drive gear
⑤ Lock gear (grease the outer rim of the teeth)
③ Gear holder

Fig.3-3-3

3-3-3. DOOR OPENER, UNDER FRAME AND STAND L (See Fig. 3-3-4)

1) Remove the cassette mechanism assembly, referring to section 3-1.
2) Remove the two clamps ① and take out the under frame ②, pulling it towards you.
3) Press down the tray lock lever ③ and the lid opener lever ④, and loosen the tray ⑤, lifting it away from you. In this state, press the clamp ⑥ and remove the door opener lever ⑦.
4) Remove the two clamps ⑧ and take out the stand L ⑨. Be careful not to exert too much force on the clamps ⑧, as this could cause damage.

ASSEMBLY NOTES:

1. Apply grease (VHJ-0100) to the grooves ⑪ on the stand L, the inside of the hole ⑬ in the drive shaft ⑫. and the mounting hole ⑭ in the door opener lever of the stand R.
2. Before fitting the stand L ⑨, be sure to move the tray ⑤ back as far as the EJECT mode position. Put the two pins ⑩ on the tray ⑤ into the grooves ⑪ on the stand L. Put the drive shaft ⑫ into the hole ⑬.
3. Be suretofasten the two clamps ① and theclamp ⑥ on the stand R, and to fasten the two clamps ⑧ on the stand L.

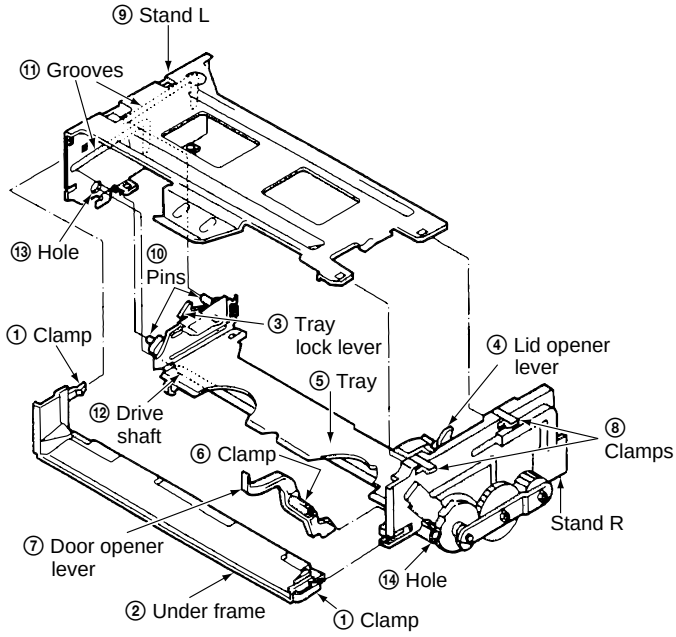


Fig.3-3-4

3-3-4. START RACK GEAR AND FRONT RACK GEAR (See Figs. 3-3-5 and 3-3-6)

1) Remove the mechanism unit, referring to section 3-2.
2) Remove the cassette mechanism assembly, referring to section 3-3-1.
3) Remove the special screw ①. When you dothis, slide the front rack gear assembly ② towards the front until it stops, then take it off the shaft ③. Take care not to damage the shaft ③.
4) Remove the spring ④.
5) Remove the clamp ⑥ on the front rack gear ⑤, then remove the start rack gear ⑦.

ASSEMBLY NOTES:

1. Apply grease (VHJ-0100) to the front rack gear ⑤ and all over the inside of the groove on the start rack gear ⑦.
2. Align the positioning mark ⑧ on the front rack gear ⑤ with the mark ⑩ on the main cam ⑨.
3. When installing the cassette mechanism assembly, refer to section 3-3-1 and align the start rack gear with the pinion gear.

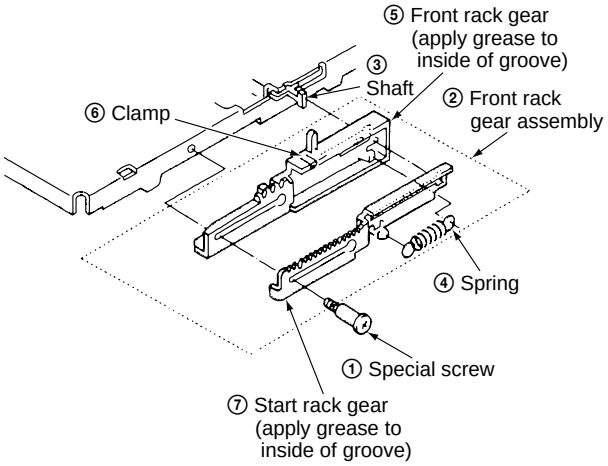
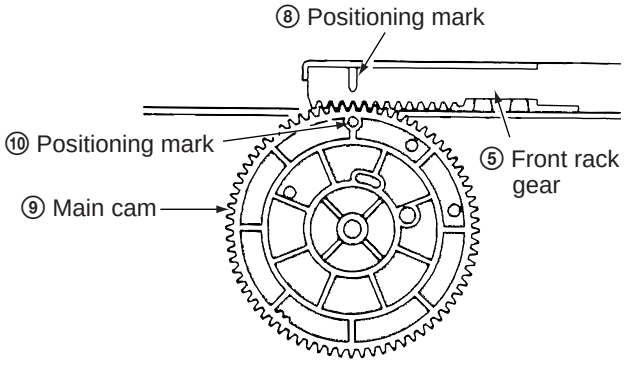

⑤ Front rack gear (apply grease to inside of groove)
③ Shaft
⑥ Clamp
② Front rack gear assembly
④ Spring
① Special screw
⑦ Start rack gear (apply grease to inside of groove)

Fig.3-3-5



Flg.3-3-6

3-4. CLEANER ROLLER ASSEMBLY (See Fig. 3-4-1)

1) Remove the clamp ① and take out the cleaner lever ②. When you do this, be careful not to bend the plastic springs Ⓐ and Ⓑ on the cleaner lever ②.
2) Remove the clamp ③, and take out the cleaner roller assembly ④. Be careful not to touch the sponge on the cleaner roller assembly ④.

ASSEMBLY NOTES:

1. When mounting the cleaner lever ② on the shaft ⑤, press the clamp ① in the direction shown by the arrow, and snap it into the mounting ⑥ on the audio R/P head assembly.

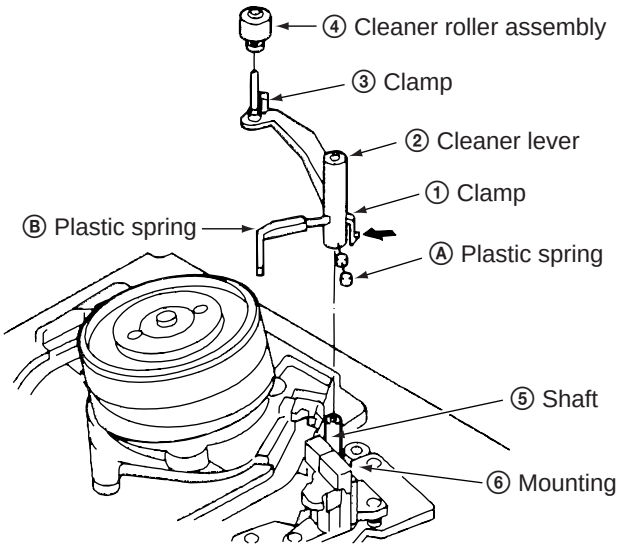


Fig.3-4-1

3-5.CYLINDER (DRUM)

3-5-1. UPPER CYLINDER ASSEMBLY (UPPER DRUM) (See Figs. 3-5-1,3-5-2,3-5-3,3-5-4)

There are two types of cylinders, one that can be disassembled into the upper cylinder (upper drum) and lower cylinder (lower drum) and one that cannot. For that type that can not, replace the cyli nder assembl y as a whole.

1) Remove the two screws ① (See Fig. 3-5-1).
2) First, tighten the handle ② of the video head removing tool (VHJ-0041), then screw the two long screws ③ evenly into the two screw holes ⑤ in the upper cylinder assembly (upper drum) ④ (See Fig. 3-5-2).
3) Hold the tool (VHJ-0041) so that the upper cylinder assembly (upper drum) ④ does not rotate, and at the same time, turn the handle ② clockwise, and remove the upper cylinder assembly (upper drum) ④.
4) Remove the tool (VHJ-0041) from the upper cylinder assembly ④.

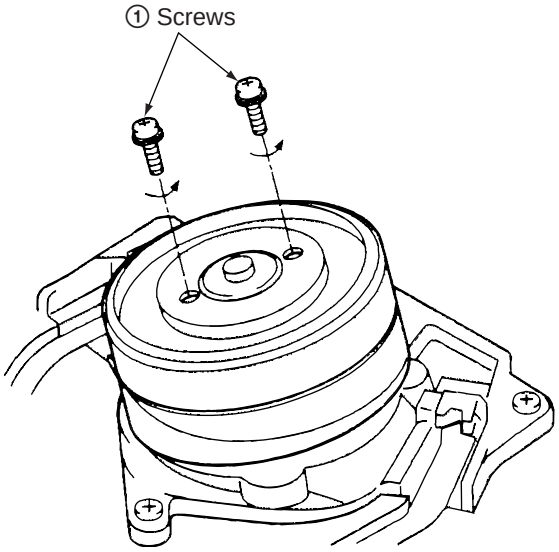


Fig.3-5-1

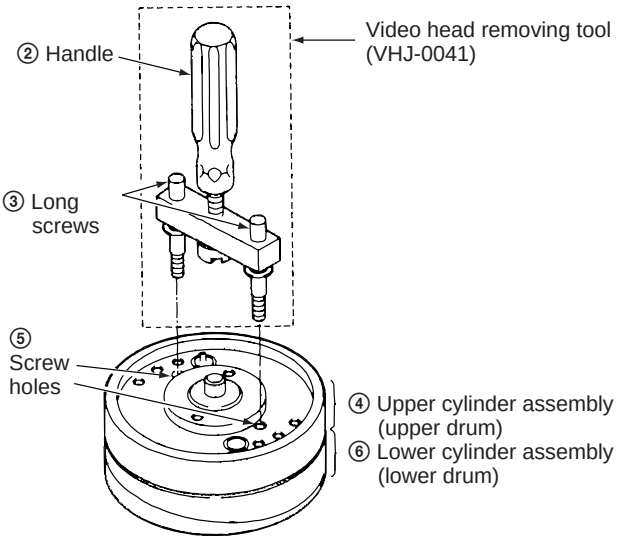

② Handle
Video head removing tool (VHJ-0041)
③ Long screws
⑤ Screw holes
④ Upper cylinder assembly (upper drum)
⑥ Lower cylinder assembly (lower drum)

Fig.3-5-2

ASSEMBLY NOTES:

1. When carrying out assembly, the CH-1 head on the upper cylinder assembly (upper drum) ④ and the lower cylinder assembly (lower drum) ⑥ must be aligned. The CH-1 head on the upper cylinder assembly ④ bears a code ⑦ such as 2N2S-V, 2N4N, or 4H6N, as shown in Fig. 3-5-3. The CH-1 on the lower cylinder assembly ⑥ has a round hole ⑧, as shown in Fig. 3-5-4. Assemble the parts so that the round hole ⑧ is next to the code ⑦ on the upper cylinder assembly.
2. Be careful not to scratch the tape path surface of the cylinder. After replacing the cylinder, clean the tape path surface of the cylinder.
3. After replacing the upper cylinder assembly, do the tape path adjustment as instructed in section 4-3 and do the swithching position adjustment of the servo circuit.

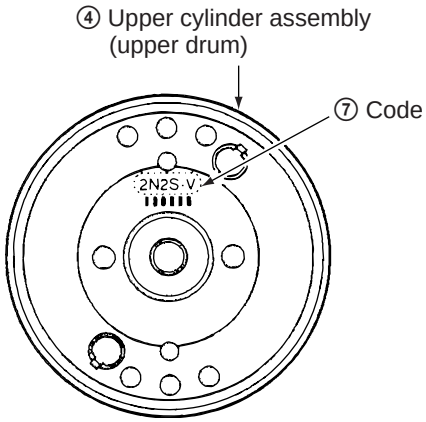
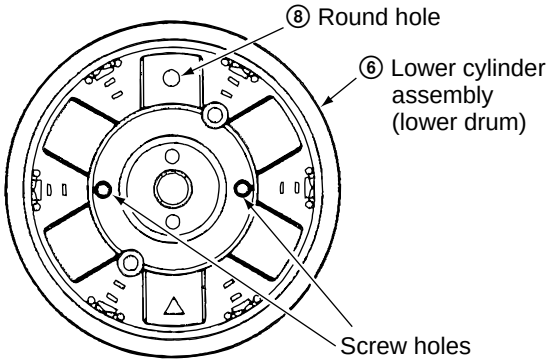


Fig. 3-5-3

[EXCEPT FOR 2-HEAD MONAURAL MODELS]



[2-HEAD MONAURAL MODELS ONLY]

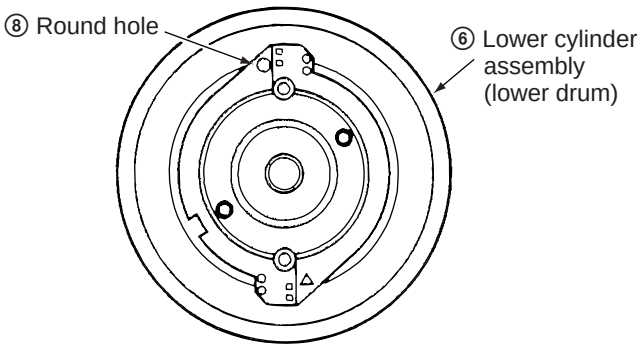


Fig. 3-5-4

3-5-2. CYLINDER MOTOR (ROTOR AND STATOR) (See Fig. 3-5-5)

1) Refer to section 3-2 and remove the mechanism unit.
2) Remove the screw ① and remove the cylindere arth assembly ② .
3) Remove the two screws ③, the rotor ④ and the spacer ⑧ .
4) Remove the three screws ⑤ and the stator ⑥.

ASSEMBLY NOTES:

1. When fitting the rotor ④, align the long hole ⑨ -beside the triangular mark on the rotor ④ - with the hole ⑩ in the rotor disk.
2. When fitting the screws ③ and ⑤, use the torque gauge screwdriver (VHJ-0014). Give the screws a tightening torque of 3 kg/cm.
3. Align the dowels ⑪ on the cylinder earth assembly ② with the holes ⑫ in the chassis.
4. After fitting the mechanism unit, do the switching position adjustment of the servo circuit.

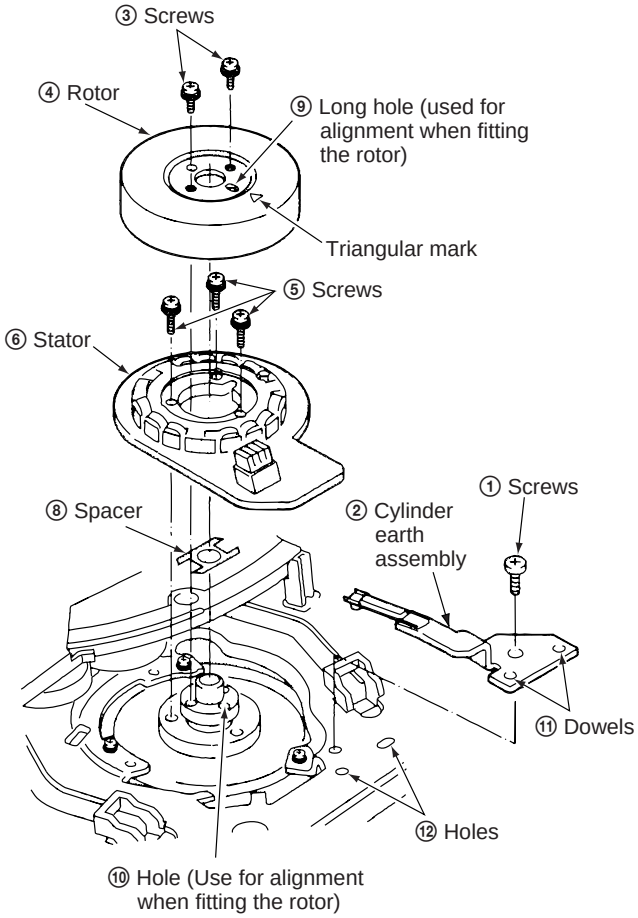


Fig. 3-5-5

3-5-3. CYLINDER ASSEMBLY (See Fig. 3-5-6)

1) Refer to sections 3-5-3, and remove the cylinder unit, the rotor, and the stator.
2) Remove the three screws ① and the cylinder assembly ②.

ASSEMBLY NOTES:

1.Be careful not to scratch or soil the top of the cylinder. After fitting the cyiinder, clean the surface.
2.Align the cylinder assembly ② with the two dowels ④ on the mechanism chassis ③.
3.After fitting the cylinder assembly, do the tape path adjustment as instructed in section 4-3 and do the switching position adjustment of the servo circuit.

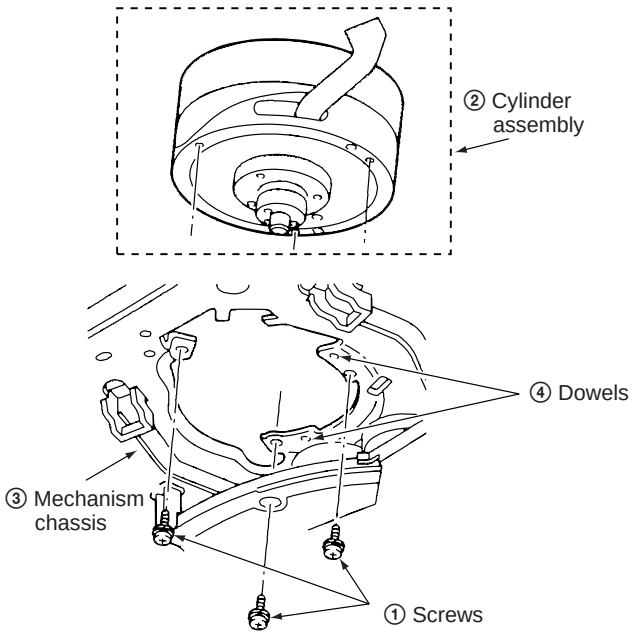


Fig.3-5-6

3-6. FE HEAD AND ACE HEAD

3-6-1. AUDIO R/P HEAD ASSEMBLY (ACE HEAD) (See Fig. 3-6-1)

1) Unplug the connector from the audio R/P head assembly (ACE head).
2) Remove the two screws ① and the audio R/P head assembly (ACE head) ②.

ASSEMBLY NOTES:

1. Align the hole ③ on the audio R/P head assembly (ACE head) with the pin ④ on the chassis unit.
2. After assembly, check that the clamp ⑤ on the cleaner roller assembly has snapped into the mounting of the audio R/P head assembly (ACE head) ②.
3. After assembly, clean the surface of the head with a soft cloth or chamois.
4. After assembly, refer to section 4-3, and adjust the head height, the azimuth and the tracking (X) position.

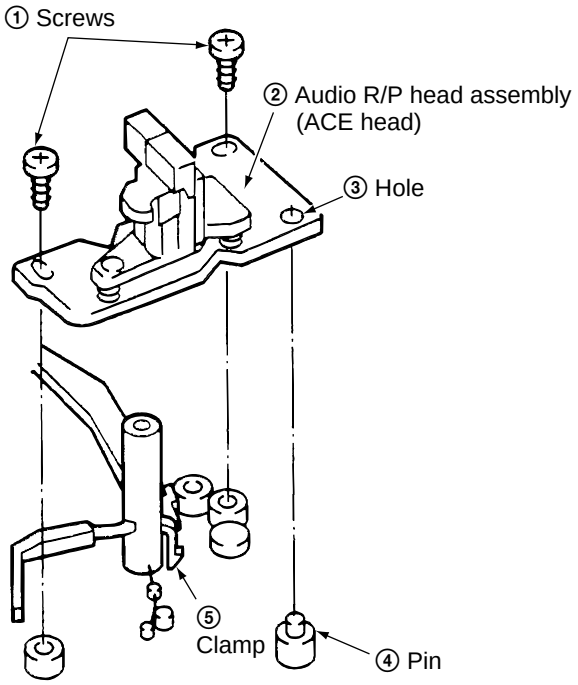


Fig. 3-6-1

3-6-2. FULL ERASE HEAD (See Fig.3-6-2)

1) Unplug the connector from the full erase head ①.
2) Remove the screw ② and the full erase head ①.

ASSEMBLY NOTE:

1. After assembly, clean the full erase head ①.

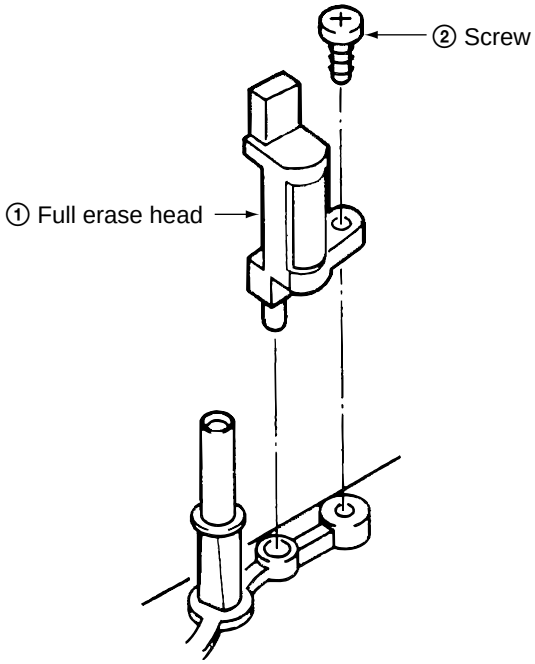


Fig. 3-6-2

3-7.CAPSTAN MOTOR

3-7-1. CAPSTAN MOTOR (See Fig.3-7-1)

1) Refer to section 3-2. then remove the mechanism unit.
2) Remove the two screws ②, then remove the harness mounting ①.
3) Remove the reel belt ③.
4) Remove the three screws ⑤ and the capstan motor ⑥.

ASSEMBLY NOTES:

1. Check that connector ④ is inserted in the CP-1 PWB assembly.
2. When fitting the thre screws ⑤, use the torque gauge screwdriver (VHJ-0014). Give the screws a tightening torque of 3.5 kg/cm.
3. After assembly, clean the capstan shaft with a soft cloth or chamois.

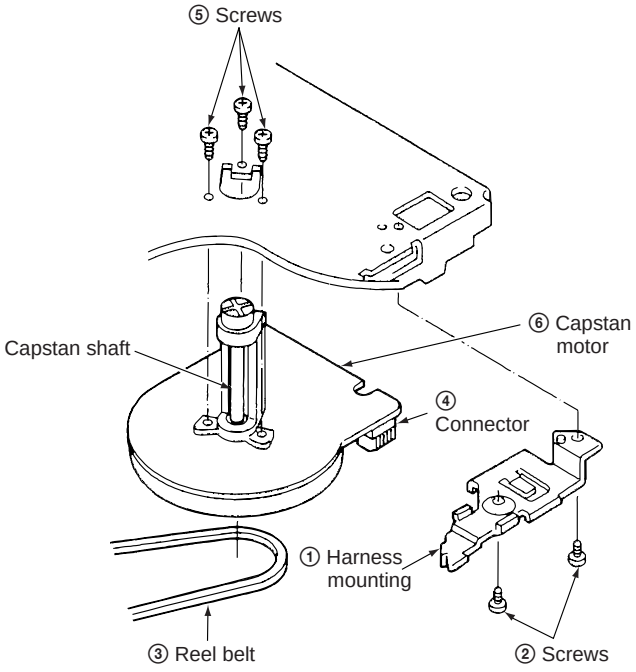


Fig. 3-7-1

3-7-2. CAPSTAN BRAKE ASSEMBLY (See Fig. 3-7-2)

1) Remove the spring ①.
2) Remove the clamp ②, then remove the capstan brake assembly ③.

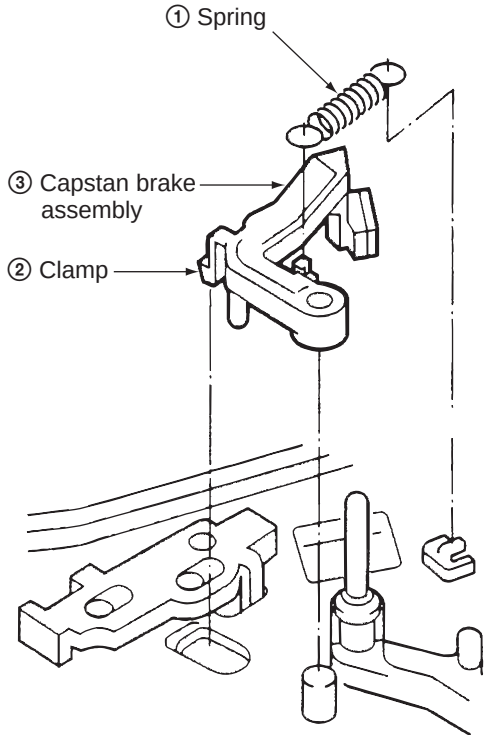


Fig. 3-7-2

3-8. LOADING MOTOR ASSEMBLY AND WORM GEAR ASSEMBLY (See Fig. 3-8-1)

1) Refer to section 3-2 and remove the mechanism unit.
2) Remove the soldering on the lead wires ② of the loading motor assembly from the MC-1 PWB assembly. When you do this, be careful not to let the soldering iron touch any other parts.
3) Press the clamp ③, and remove the loading motor assembly ① and the damper ④. Be careful not to exert too much force on the clamp ③.
4) Remove the worm gear assembly ⑤. To maintain performance, do not dis-assemble the worm gear assembly ⑤.

ASSEMBLY NOTES:

1. Apply grease (VHJ-0010) to the teeth of the worm gear assembly.
2. Check that the clamps ③ and ⑥ are securing the loading motor assembly.
3. Check the polarity of the lead wires ② (the orange wire is the positive terminal, and the gray wire is the negative terminal). After soldering the lead wires ②, adjust them so that they do not touch the friction gear assembly.

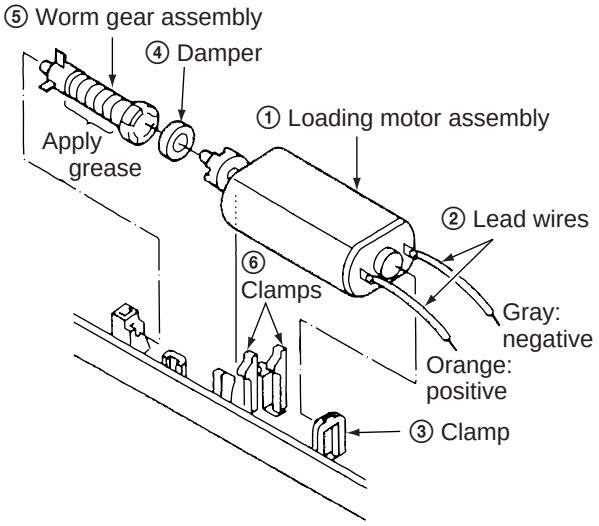


Fig. 3-8-1

3-9. PINCH ROLLER PRESSURE MECHANISM

3-9-1. PINCH ROLLER LEVER ASSEMBLY (See Fig. 3-9-1)

1) Remove the clamp ①, then remove the pinch lift mounting ②.
2) Remove the spring ③, then remove the pinch roller lever assembly ④ off the pinch lift mounting ②. Before you do this, align the Indentation ⑤ on the pinch roller lever assembly ④ with the clamp ⑥ on the pinch lift mounting ②.

ASSEMBLY NOTE:

1. Be careful to keep the surface of the pinch rollerf ree of dust and dirt.

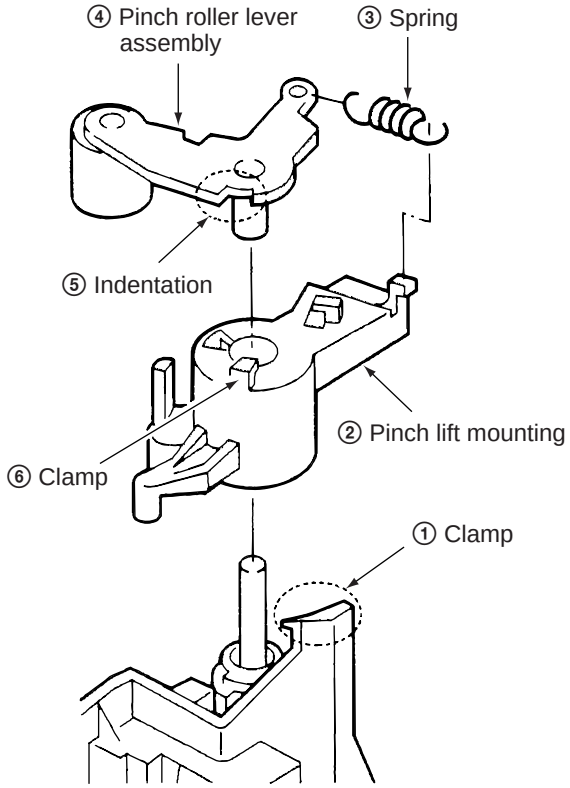


Fig. 3-9-1

3-9-2. PINCH LIFT CAM AND PINCH CAM GEAR (See Figs. 3-9-2 and 3-9-3)

1) Refer to section 3-2 and remove the mechanism unit. When you do this, make sure the mechanism is in EJECT mode.
2) Refer to section 3-9-1 and remove the pinch roller lever assembly.
3) After removing the screw ①, undo the three clamps ②, then remove the opener mounting ③.
4) Remove the clamp ④ and the pinch lift cam ⑤.
5) Remove the pinch cam gear ⑥.

ASSEMBLY NOTES:

1. Apply grease (VHJ-0100) around the shaft ⑦, all over the teeth Ⓑ of the pinch cam gear ⑥, all over the teeth of the pinch lift cam ⑤, all over the cam grooves Ⓐ, and all over the "V Part Ⓒ" of the opener mounting ③. Apply grease (VHJ-0101) to the outside of the shaft ⑧ and all over the top cam Ⓓ of the pinch cam gear ⑥.
2. Check that the positioning mark ⑩ on the mode switch ⑨ is aligned with the arrow ⑪ on the MC-1 PWB assembly, as shown in Fig. 3-9-3. Then align the triangular mark ⑫ on the pinch cam gear ⑥ with the arrow ⑪ on the MC-1 PWB assembly. After that, align the round hole ⑬ on the pinch lift cam ⑤ with the indentation ⑭ on the pinch cam gear ⑥.
   If you have carried out the above alignments and the pinch roller will still not move up and down or perform the pressing movement correctly, refer to section 3-15 and check the alignment of the gear wheels 1 and 2, the main cam, and the mode switch.

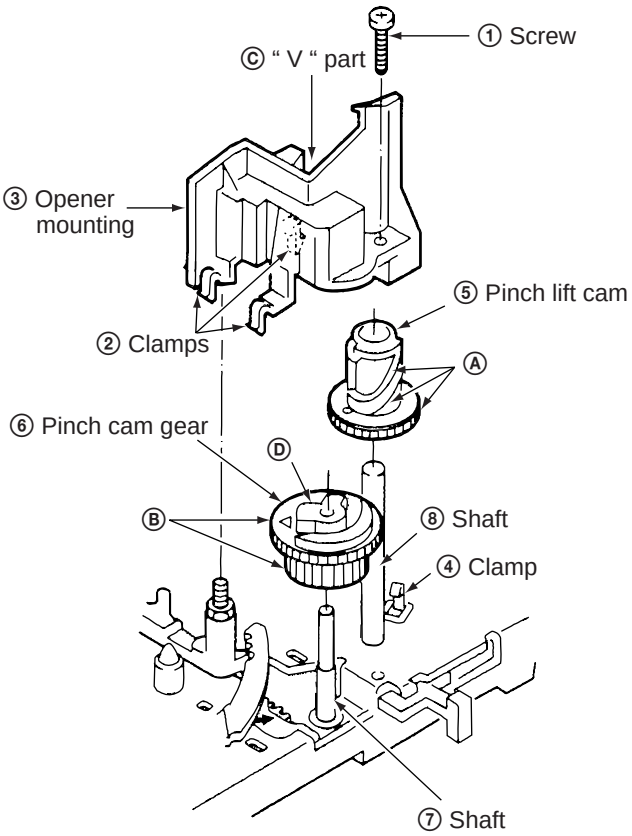


Fig. 3-9-2

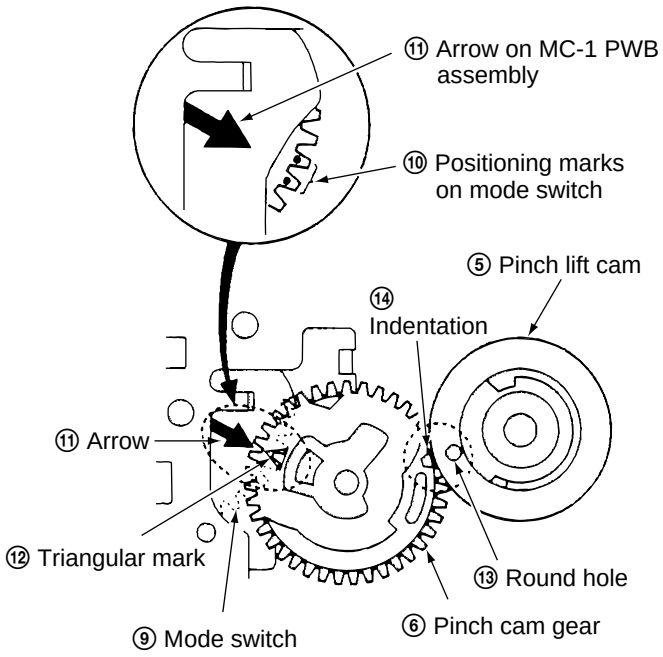


Fig. 3-9-3

3-10. L GUIDE LEVER ASSEMBLY AND LOAD LEVER ASSEMBLY (See Figs. 3-10-1)

1) Refer to section 3-3 and remove the cassette mechanism assembly.
2) Refer to sections 3-9-1 and 3-9-2, then remove the pinch roller lever assembly and the opener mounting.
3) After removing the washer ④, remove the L guide act lever assembly ⑤.
4) Remove the special nut ⑥, then remove the load lever assembly ⑦ and the L guide lever spring ⑧.

ASSEMBLY NOTES:

1) Apply grease (VHJ-0100) to the toothed area Ⓐ of the L guide act lever assembly ⑤ and around the shafts ⑨ and ⑩.
2) Refer to section 4-3 and adjust the height of the load lever assembly.
3) Hook the L guide lever spring ⑧ into the stopper ⑬ and load lever assembly ⑦ shown in Fig. A.
4) Put the pin ⑪ of the L guide act lever assembly into the cam groove ⑫ of the crescent slide.

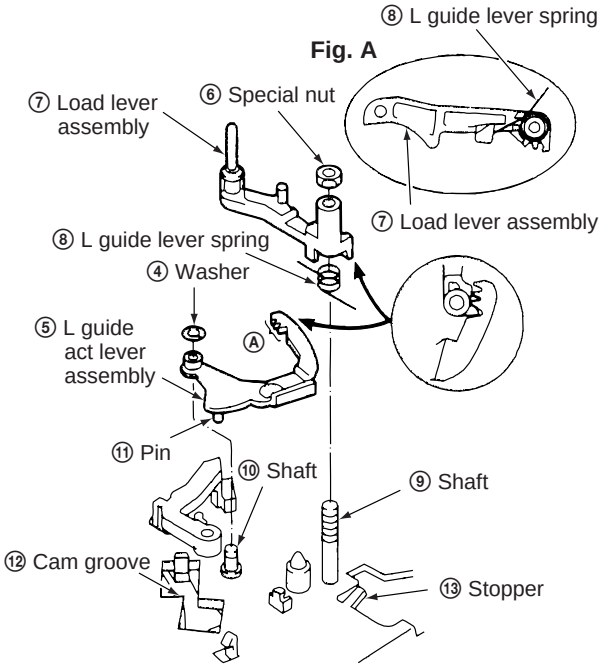


Fig.3-10-1

3-11. BT LEVER ASSEMBLY (See Fig. 3-11-1)

1) Refer to section 3-2 and remove the mechanism unit.
2) Refer to section 3-3-1 and remove the cassette mechanism assembly.
3) Remove the BT spring ①.
4) Remove the clamp ② on the underside of the mechanism chassis, then remove the BT lever assembly ③.
5) Remove the clamp ⑤ on the band brake assembly ④. Then, as shown in Fig. A, align the other end of the band brake assembly with the protruding parts of the BT lever assembly ③ before removing it.

ASSEMBLY NOTES:

1. When fitting the BT lever assembly ③, be careful not to bend the stopper ⑥ or the S incline mounting assembly ⑦ out of shape by knocking it against them.
2. Hook the long hook of the BT spring ① into the BT lever assembly ③, as shown in Fig. B.
3. After assembly. make sure that the mountings on both ends of the band brake assembly ④ are positioned as shown in Fig. C.
4. After assembly, refer to section 4-2-1, and make the appropriate adjustment.

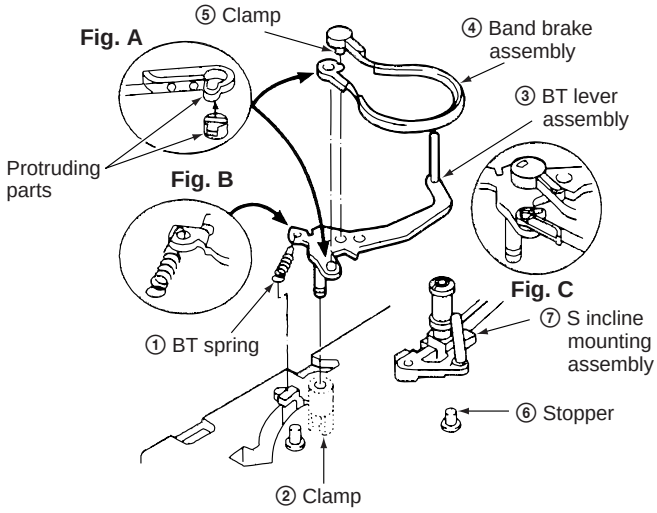


Fig. 3-11-1

3-12. REEL DRIVE MECHANISM

3-12-1. REEL BELT, REEL PULLEY, FRICTION GEAR ASSEMBLY AND CLUTCH CHANGE LEVER (See Fig. 3-12-1)

1) Refer to section 3-2 and remove the mechanism unit.
2) Remove the reel belt ① from the reel pulley ②.
3) Take off the washer ③ and remove the reel pulley ②.
4) Take off the washer ④ and remove the friction gear assembly ⑤.
5) Remove the clutch change spring ⑥.
6) Remove the clamp ⑦ gripping the top of the mechanism chassis, then remove the clutch change lever ⑧.

ASSEMBLY NOTES:

1. After cleaning the shafts ⑨ and ⑩, apply a drop of oil (VHJ-0099) to each.
2. Be careful not to get any grease on the reel belt ①.

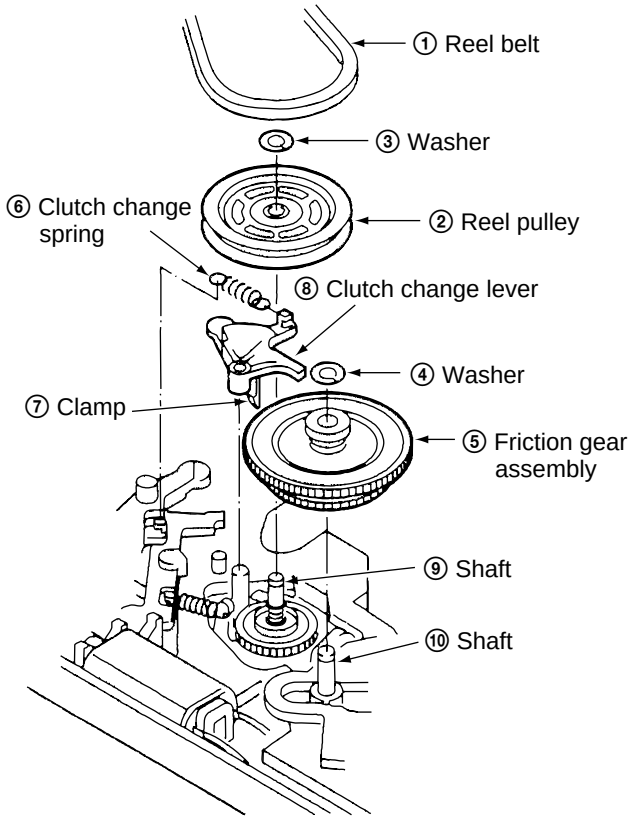


Fig. 3-12-1

3-12-2. CLUTCH MOUNTING ASSEMBLY (See Fig.3-12-2)

1) Refer to section 3-3-1 and remove the cassette mechanism assembly.
2) Refer to section 3-12-1 and remove the reel pulley.
3) Remove the two screws ①, then remove the clutch mounting assembly ②.

ASSEMBLY NOTES:

1. Align the two holes 3 with the shafts ④ and ⑤. Be careful not to press part A of the clutch mounting assembly ② against the band brake assembly.
2. After assembly, make sure that the clamp on the clutch change lever has snapped into the chassis.

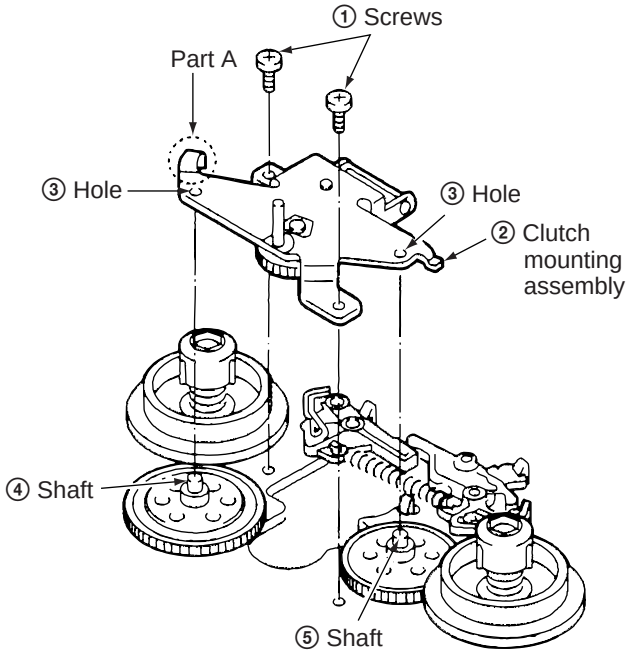


Fig. 3-12-2

3-12-3. S SOFT LEVER, SUPPLY REEL ASSEMBLY AND S REEL GEAR (See Fig. 3-12-3)

1) Remove the S soft spring ①.
2) Remove the clamp ②, then remove the S soft lever ③.
3) Refer to section 3-12-2 and remove the clutch mounting assembly.
4) Refer to section 3-11 and remove the band brake assembly, then remove the supply reel assembly ④ and the S reel gear ⑤.

ASSEMBLY NOTES:

1. After cleaning the shafts ⑥ and ⑦, apply a drop of oil (VHJ-0099) to each.
2. After assembly, clean the side of the supply reel assembly ④.

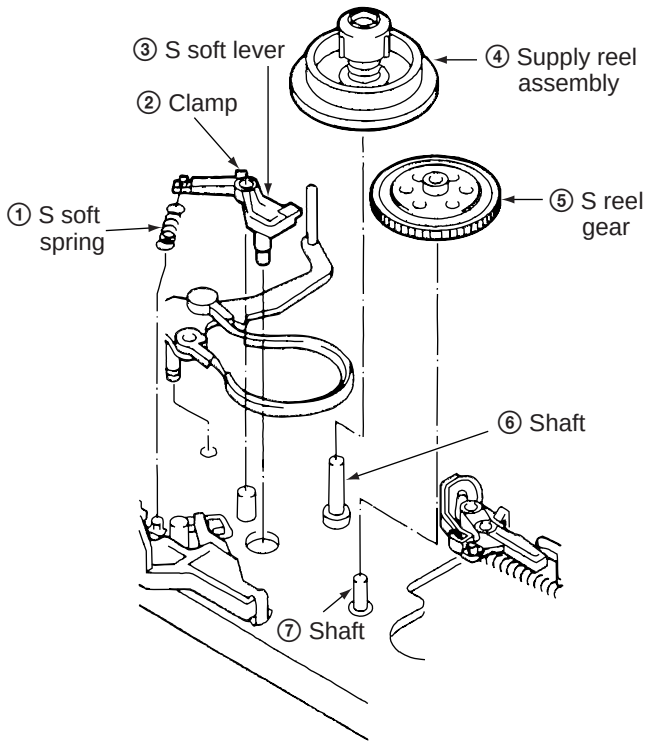


Fig. 3-12-3

3-12-4. T SOFT BRAKE ASSEMBLY, TAKE UP REEL ASSEMBLY, T REEL GEAR (See Fig. 3-12-4)

1) Remove the T soft spring ①.
2) Remove the clamp ②, then remove the T soft brake assembly ③.
3) Refer to section 3-12-2 and remove the clutch mounting assembly.
4) Pressing the T brake assembly ④ in the direction of the arrow, remove the take up reel assembly ⑤ and the T reel gear ⑥.

ASSEMBLY NOTE:

1. After cleaning the shafts ⑦ and ⑧, apply a drop of oil (VHJ-0099) to each.

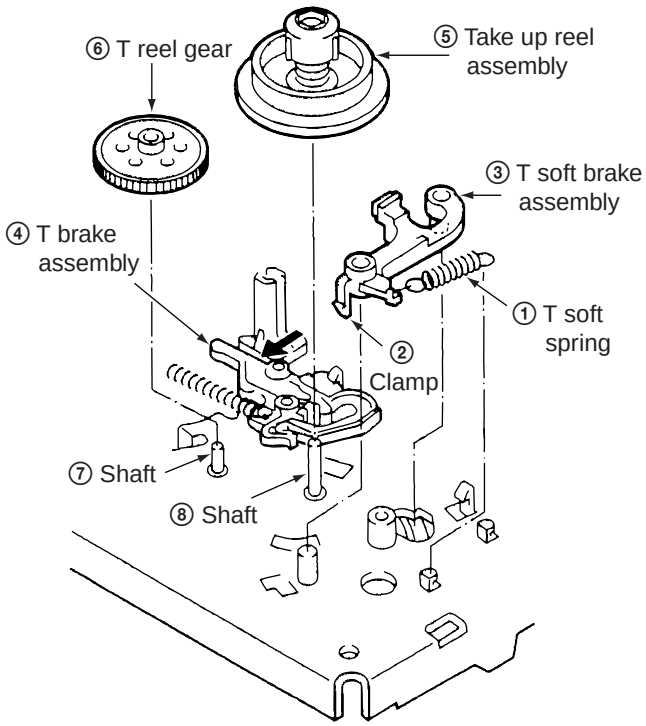


Fig.3-12-4

3-13. BRAKES

3-13-1. S BRAKE ASSEMBLY, T BRAKE ASSEMBLY, T BRAKE ACT SLIDE (See Fig. 3-13-1)

1) Refer to section 3-3-1 and remove the cassette mechanism assembly.
2) Remove the two clamps ①, then remove the T brake act slide ②. (Note: You can remove the S brake assembly ⑦ and the T brake assembly ⑤ without removing the T brake act slide ②.)
3) Remove the brake spring ③.
4) Remove the two clamps ④ simultaneously, then remove the T brake assembly ⑤.
5) Remove the clamp ⑥, then remove the S brake assembly ⑦.

ASSEMBLY NOTES:

1. Apply grease (VHJ-0100) to the shafts ⑧ and ⑨.
2. When fitting the T brake act slide ②, align the mark ⑩ with the shaft ⑪.

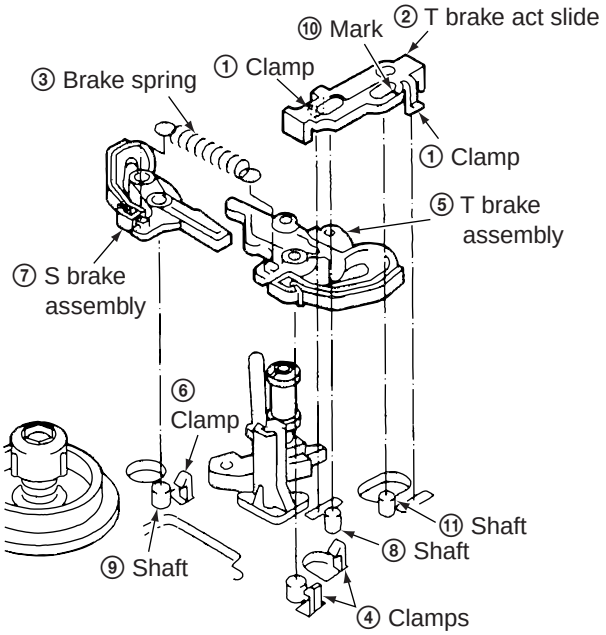


Fig. 3-13-1

3-13-2. BRAKE CONTROL LEVER AND BRAKE ACT LEVER ASSEMBLY (See Fig. 3-13-2)

1) Refer to section 3-2 and remove the mechanism unit.
2) Refer to section 3-15 and remove the wheel gear 2.
3) Refer to sections 3-12-1, then remove the reel belt and the reel pulley.
4) Remove the clamp ①, then remove the wheel gear 1 ②.
5) Remove the clutch change spring ③.
6) Remove the clamps ④ and ⑤, then remove the brake control lever ⑥. Remove the clamp ④ on the topside of the mechanlsm chassis.
7) Remove the brake return spring ⑦.
8) Refer to section 3-8 and remove the worm gear assembly.
9) Remove the clamp ⑧ and clamp ⑤, then remove the brake act lever assembly ⑨. To maintain the performance of the brake act lever assembly ⑨, do not disassemble it.

ASSEMBLY NOTES:

1. Apply grease (VHJ-0100) to the shafts ⑩ and ⑪, to the teeth of the wheel gear 1 ②. and to the pin ⑫ of the brake control lever ⑥ .
2. Put the pin ⑬ of the brake control lever ⑥ into the cam groove ⑭ of the crescent slide.
3. Before fitting the wheel gear 1 ② , align the hole ⑮ with the hole ⑯ on the mechanism chassis.
4. Refer to section 3-15 and align the wheel gear 2.

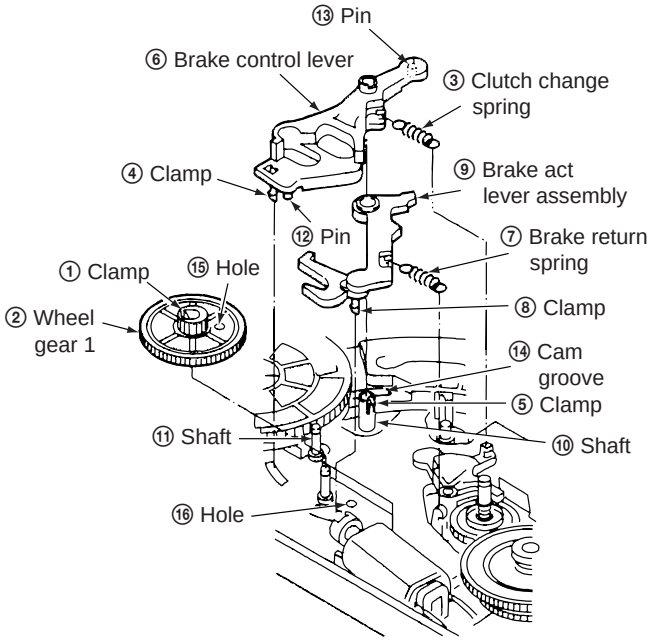


Fig. 3-13-2

3-13-3. S BRAKE ACT SLIDE AND BT SPRING LEVER ASSEMBLY (See Figs. 3-13-3 and 3-13-4)

1) Refer to section 3-16 and remove the crescent slide.
2) Refer to section 3-12-1 and remove the friction gear assembly.
3) Slide the S brake act slide ① in the direction of the arrow Ⓐ , then remove it.
4) Refer to section 3-11 and remove the BTspring.
5) Press the BTspring lever assembly ② until it touches the pin ③, then remove it.

ASSEMBLY NOTES:

1. Apply grease (VHJ-0100) to the shaft ④ shown in Fig. 3-13-3, and to the BT spring lever assembiy ② and the S brake act slide ① shown in Fig. 3-13-4.
2. After mounting the BT spring lever assembly ② on the Shaft ④, hook the BT spring onto the clamp ⑤ and press it until it touches the pin ⑥.
3. Make sure that the clamps ⑦, ⑧ and ⑨ have snapped Into the S brake act slide ①. Align the arrow ⑩ on the S brake act slide ① with the arrow ⑪ on the mechanism chassis.

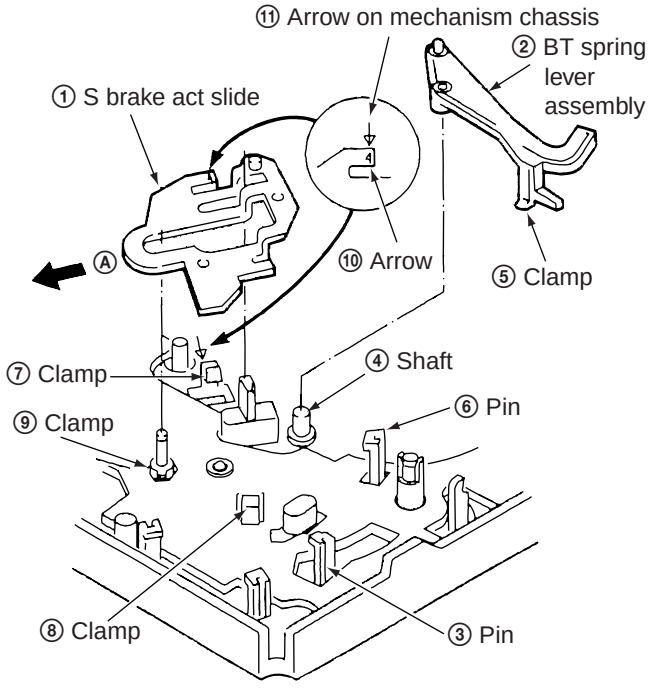


Fig. 3-13-3

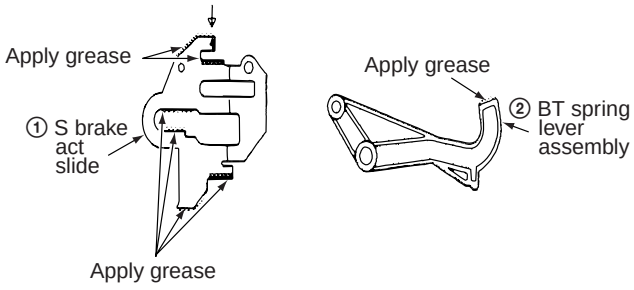


Fig. 3-13-4

3-14. GUIDES

3-14-1. GUIDE ROLLER ASSEMBLY (See Fig. 3-14-1)

1) Unscrew the two screws ①. When you do this, be careful not to damage the cylinder or the video head.
2) Remove the two guide roller assemblies ② by unscrewing them anticlockwise.

ASSEMBLY NOTES:

1. Tighten the two screws ① to a torque of 600 g/cm. After tightening, apply a screw-locking glue.
2. After replacing the parts, be sure to clean the guide roller and carry out tape path adjustment as described in section 4-3.

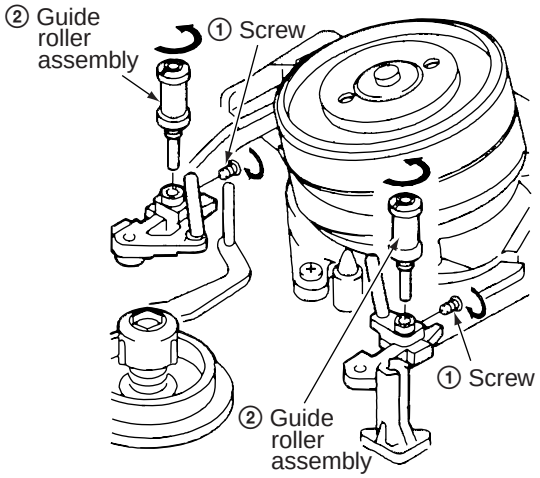


Fig. 3-14-1

3-14-2. S AND T INCLINE MOUNTING ASSEMBLIES (See Fig. 3-14-2)

1) Refer to section 3-2 and remove the mechanism unit.
2) Refer to section 3-4 and remove the cleaner lever.
3) Remove the four screws ⑤ and take off the two catcher mountings ⑥.
4) Refer to section 3-1 and rotate the loading motor in the PLAY direction until tape loading is completed.
5) Shift the S incline mounting assembly ① slightly, in the direction of the arrow Ⓐ, then remove it from the S load lever assembly ②.
6) Shift the T incline mounting assembly ③ slightly, in the direction of the arrow Ⓑ, then remove it from the T load lever assembly ④.

ASSEMBLY NOTES:

1. Apply grease (VHJ-0100) to the rail (top, underside and sides) on the mechanism chassis.
2. When fitting the S and T incline mounting assemblies ① and ③ into the rail, turn the loading motor manually in the EJECT direction. When tape unloading begins, watch out in case the S and T incline mounting assemblies ① and ③ get caught in the rail.
3. Aline the dowels on the catcher mounting ⑥ with the holes ⑦ in the mechanism chassis.
4. After repiacing the parts, clean the cylinder and the roller guide, then adjust the tape path as described in section 4-3.

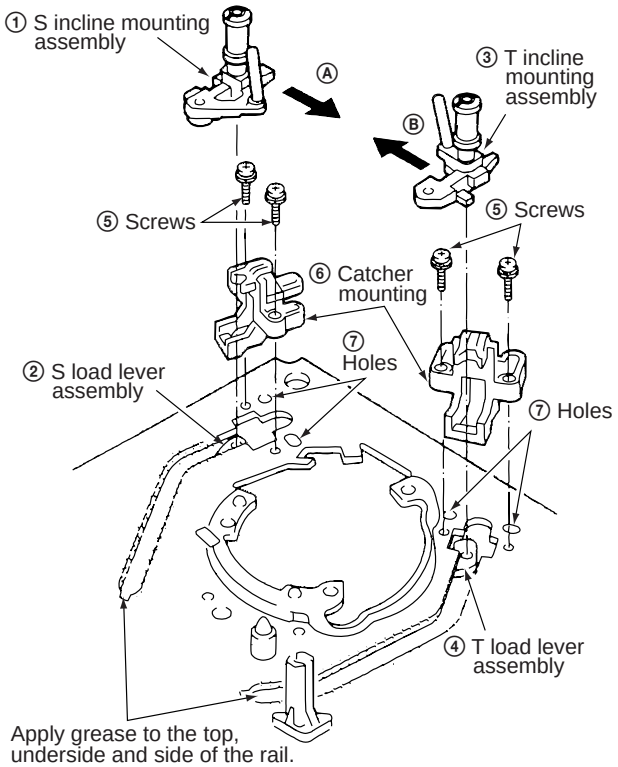


Fig. 3-14-2

3-15. WHEEL GEAR 2, MAIN CAM AND MODE SWITCH (See Figs. 3-15-1 and 3-15-2)

1) Refer to section 3-2 and remove the mechanism unit. When you do this, make sure the mechanism is in EJECT mode.
2) Refer to section 3-7-1, then remove the harness mounting.
3) Remove the clamp ①, then remove the wheel gear 2 ②.
4) Remove the washer ③, then remove the main cam ④.
5) After unscrewing the screw ⑤, remove the soldering from the terminal of the mode switch ⑥.
6) Remove the clamp ⑦, then remove the mode switch ⑥.

ASSEMBLY NOTES:

1. Apply grease (VHJ-0100) to the shafts ⑧, ⑨ and ⑩, to the teeth of the main cam ④, and to the all over the cam groove of main cam ④.
2. When fitting the modes witch ⑥, align it in ⒶⒷ order as shown in Fig. 3-15-2. The alignment of the part Ⓑ is shown in Fig. A. Position the teeth of the mode switch ⑥ so that the sixth tooth space left of part Ⓐ is aligned with the triangular mark on the pinch cam gear ⑪. After aligning part Ⓑ, refer to section 3-9-2 and check the positioning of the mode switch, the pinch cam gear and the pinch lift cam.
3. Beforehand, remove the soldering from the soldered part of the MC-1 PWB assembly, in order to prevent the mode switch ⑥ being warped. Solder the mode switch ⑥ after tightening the screw ⑤ (See Fig. 3-15-1) .
4. Align the hole in the crescent slide ⑫ with the hole in the mechanism chassis, as shown at point Ⓖ in Fig. 3-15-2 (refer to section 3-16 and see the holes ⑤ and ⑥ in Fig. 3-16-1).
5. When fitting the main cam ④, position the mode switch ⑥ and the front rack gear ⑬ as shown at points Ⓒ and Ⓓ respectively in Fig. 3-15-2.
6. When fitting the gear wheel 2 ②, position the main cam ④ and the wheel gear 1 ⑭ as shown at points Ⓔ and Ⓕ respectively in Fig. 3-15-2.

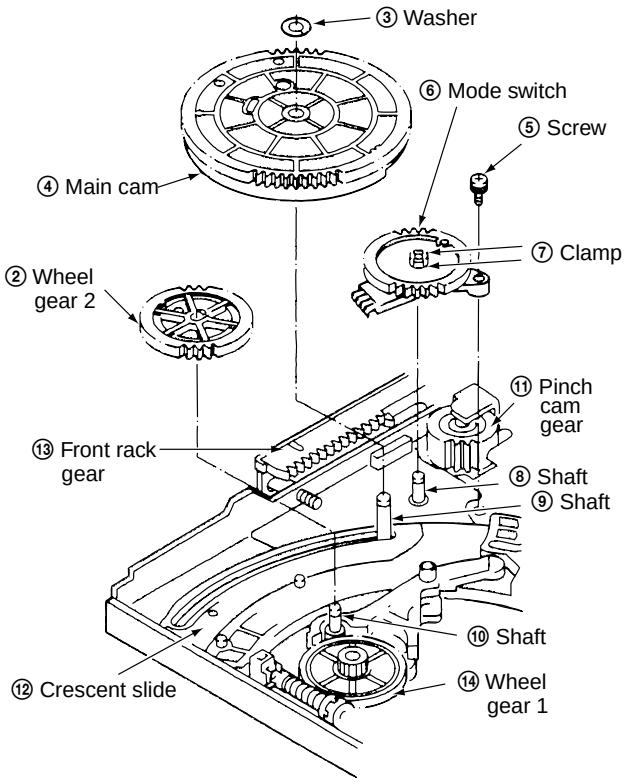


Fig. 3-15-1

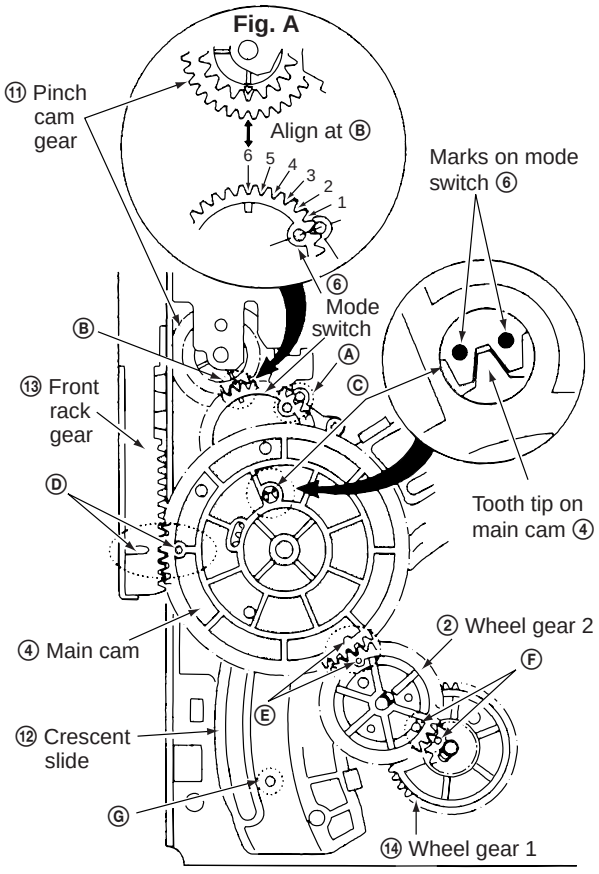


Fig. 3-15-2

3-16. CRESCENT SLIDE
(See Figs. 3-16-1 and 3-16-2)

1) Refer to section 3-2 and remove the mechanism unit. When you do this, make sure the mechanism is in EJECT mode.
2) Refer to section 3-3-1 and remove the cassette mechanism assembly.
3) Refer to section 3-7-2 and remove the capstan brake assembly.
4) Refer to section 3-12-4 and remove the T soft brake assembly.
5) Refer to section 3-13-1 and remove the T brake act slide.
6) Refer to section 3-12-1, then remove the reel belt and the reel pulley.
7) Refer to section 3-15, then remove the wheel gear 2 and the main cam.
8) Refer to section 3-13-2, then remove the wheel gear 1 and the brake control lever.
9) Remove the two screws ⑪, then remove the crescent mounting ⑫.
10) Remove the clamps ① and ②, then raise the right end of the crescent slide ③ slightly. Slide the crescent slide ③ to the right until it comes away from the clamp ④, then remove it.

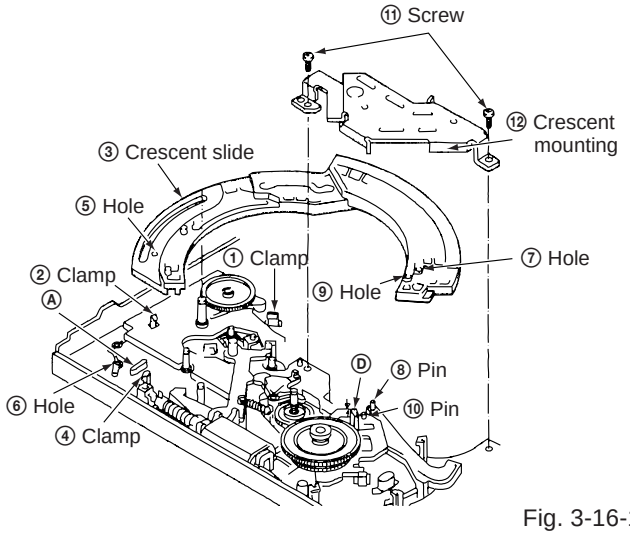


Fig. 3-16-1

ASSEMBLY NOTES:

1. Apply grease (VHJ-0100) to the points Ⓐ, Ⓑ, Ⓒ and Ⓓ in Fig. 3-16-1, and to the crescent slide ③ shown in Fig. 3-16-2.
2. Before fitting the crescent slide ③, refer to section 3-13-3 and align the arrow on the S brake act slide with the arrow on the mechanism chassis. Then refer to Fig. 3-17-3 and check that the S load gear and the T load gear have completed tape unloading.
3. When assembling the parts, raise the right side of the crescent slide ③ slightly, and keeping it in this position, slot the left side into the clamp ④, then align the hole ⑤ with the hole ⑥ in the mechanism chassis. When you do this, check that the hole ⑦ is aligned with the pin ⑧ on the BT spring lever assembly, and that the hole ⑨ is aligned with the pin ⑩ on the S brake act slide, before pressing the crescent slide ③ into place. Check that the clamps ①, ② and ④ are engaged.
4. After assembly, check that each leverand each brake is working properly.

Apply grease to the areas shown in ▭
• The places marked by dots should be greased particularly generously.

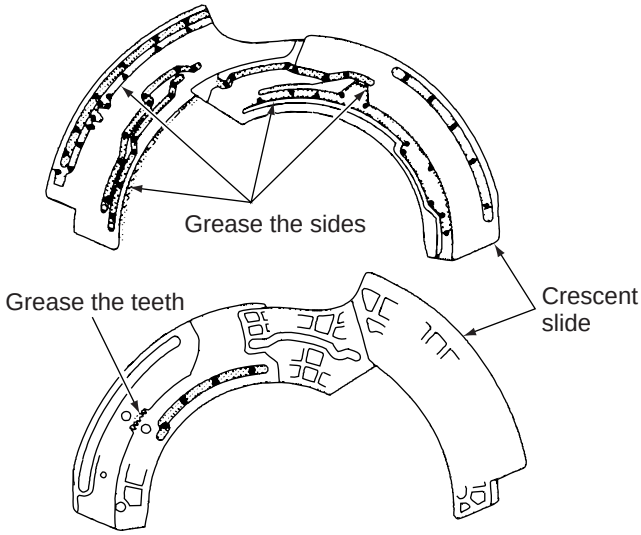


Fig. 3-16-2

3-17. S LOAD GEAR, T LOAD GEAR, S LOAD LEVER ASSEMBLY AND T LOAD LEVER ASSEMBLY (See Figs. 3-17-1. 3-17-2 and 3-17-3)

1) Refer to section 3-16 and remove the crescent slide.
2) Refer to section 3-14-2 and remove the S and T incline mounting assemblies.
3) Remove the clamp ①, then remove the components: the S load gear ②, the S load spring ③ and the S load lever assembly ④. When you do this, be careful not to damage the clamp ①, which can be damaged easily. Again, be careful when you disassemble the components, as the S load spring ③ will spring out.
4) Remove the following components: the T load gear ⑤, the T load spring ⑥, and the T load lever assembly ⑦. Be careful when you disassemble the components, as the T load spring ⑥ will spring out.

ASSEMBLY NOTES:

1. Apply grease (VHJ-0100) to the shafts ⑧, ⑨ and parts A shown in Fig. 3-17-1. Then apply grease (VHJ-0100) to the parts shown in Fig. 3-17-2.
2. When fitting the S load gear ② and the T load gear ⑤ align them in the tape-loaded state, as shown in Fig. A in Fig. 3-17-3. Again, after completing tape-unloading on these gears, check that they are positioned as shown in Fig. B in Fig. 3-17-3, then refer to section 3-14-2 and fit the S and T incline mounting assemblies.

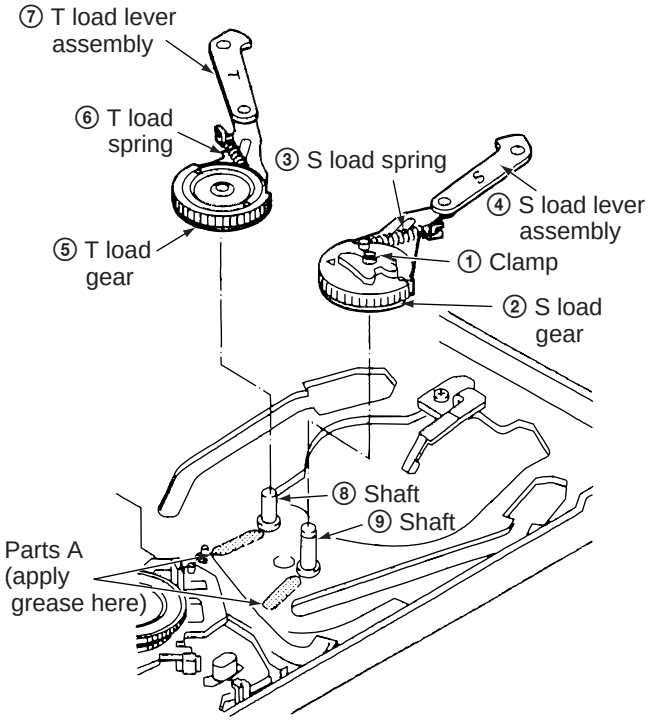
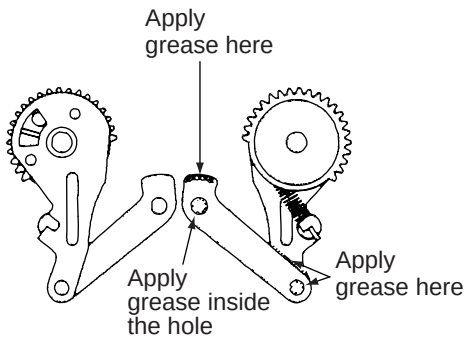


Fig. 3-17-1

(T side)



(S side)

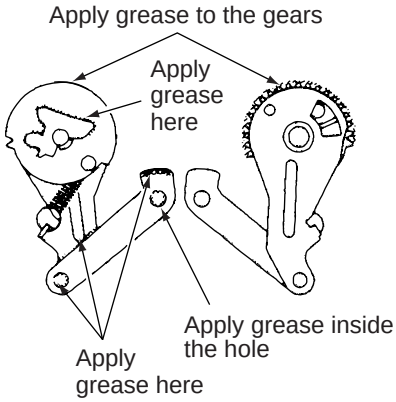


Fig. 3-17-2

Fig. A: When tape loading is complete

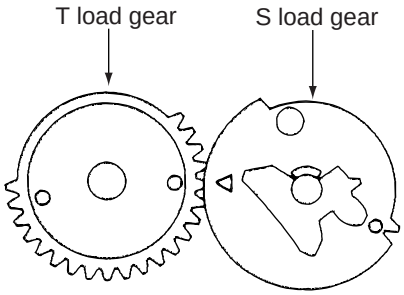


Fig. B: When tape unloading is complete

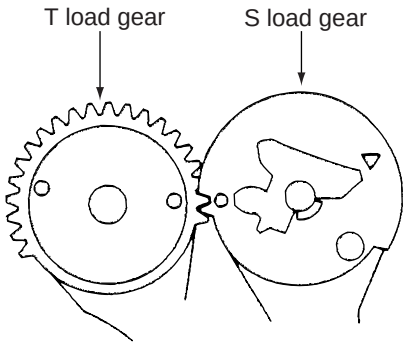


Fig. 3-17-3

3-18. TAPE SENSORS, REEL SENSOR AND EP SW LEVER

3-18-1 TAPE TOP SENSOR AND TAPE END SENSOR (See Fig. 3-18-1)

1) Refer to section 3-2 and remove the mechanism unit.
2) Refer to section 3-3-1 and remove the cassette mechanism assembly.
3) Remove the soldering from the MC-1 PWB assembly, then remove the photo diodes ①, ② and the LED ③. When removing the photo diode ② on the tape top sensor side, refer to section 3-15 and remove the main cam.

ASSEMBLY NOTES:

1. Fit the photo diodes ① and ② so that their photoreceptors to face the LED ③, as shown in Fig. 3-18-1. Align the cuts in the LED ③ and the holder ④.
   Push the photo diodes ①, ② and the LED ③ as far down as they will go, so that they do not protrude above the top of their holders.
2. Do the soldering quickly.

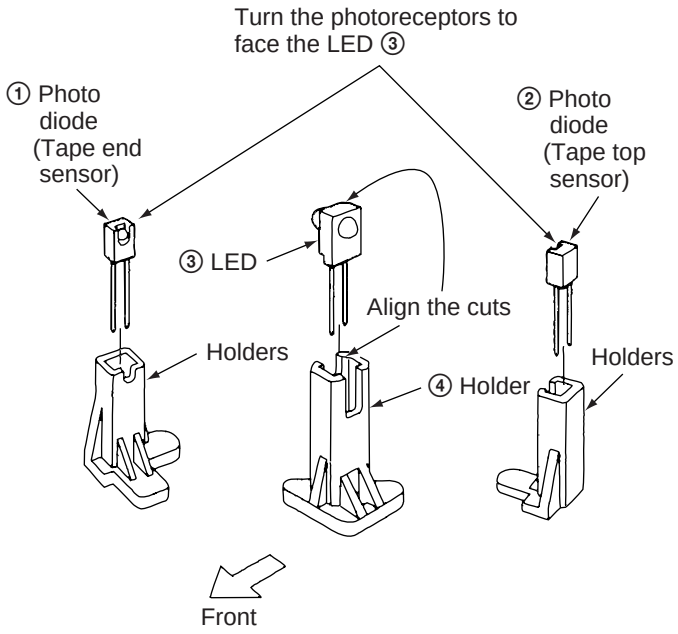


Fig. 3-18-1

3-18-2. REEL SENSOR (See Fig. 3-18-2)

1) Refer to sections 3-12-2 and 3-12-4. then remove the clutch mounting assembly, the T soft brake assembly and the take up reel assembly.
2) Refer to section 3-13-2, then remove the wheel gear 2, the wheel gear 1. and the brake control lever.
3) Remove the soldering from the MC-1 PWB assembly, then remove the photo diode (reel sensor) ①.

ASSEMBLY NOTES:

1. When assembling the parts, align the cut on the photo diode (reel sensor) ① with the protrusion on the mechanism chassis ②.
2. Do the soldering quickly.

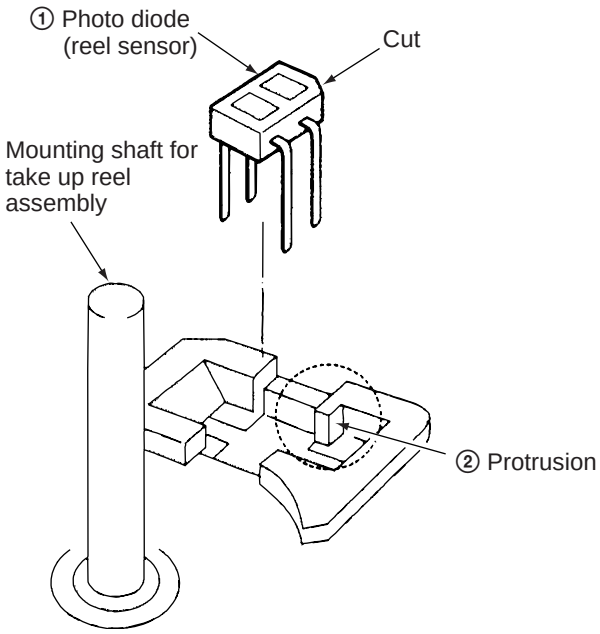


Fig. 3-18-2

3-18-3. EP SWITCH LEVER (See Fig. 3-18-3)

1) Refer to section 3-3-1 and remove the cassette mechanism assembly.
2) Remove the EP switch spring ①.
3) Remove the clamp ②, then remove the EP switch lever ③.

ASSEMBLY NOTES:

1. Apply grease (VHJ-0100) to the protrusion ④ on the back of the EP switch lever ③.
2. After fitting the cassette mechanism assembly. check that in EJECT mode. the EP switch lever ③ does not touch the EP switch ⑤ .

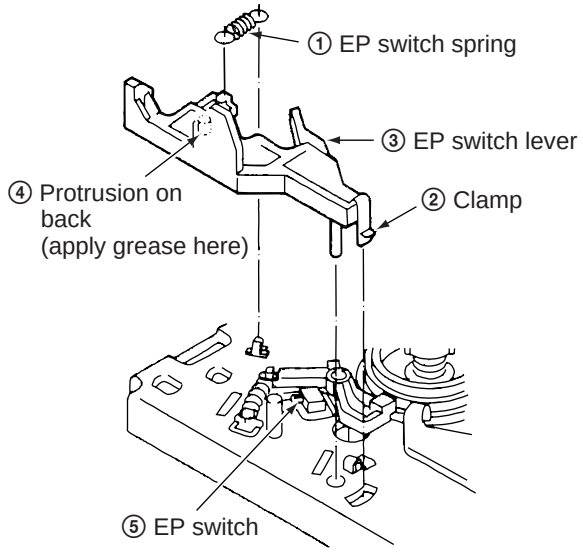


Fig. 3-18-3

4. MECHANISM CHECKS AND ADJUSTMENTS

4-1. REEL TABLE TORQUE CHECK

1) With the power switch turned OFF, stick black vinyl tape over the photo diodes of the tape sensors. Then turn the power switch ON. Front loading will begin. Refer to section 3-2 and Fig. 3-2-2. and release the locks of the tray lock lever and the lid opener lever.

NOTES:

1. The measurements must be taken without any incandescent light or daylight.
2. If the mechanism cannot be put into PLAY, FF or REW mode by the method described in 1) above, make a dummy cassette tape, as shown in Fig. 4-1-2. The dummy cassette tape is made as follows: Unscrew the five screws on the underside, remove the reels, leaf springs and other parts on the supply and take up sides, make holes in the upper surface as wide as the reel diameter, then assemble the parts.

2) Put the mechanism into REW mode, wait at least 10 seconds, then measure the torque value of the reel table on the supply side. It should be at least 600 g/cm. Take the measurement with the torque dial gauge (VHJ-0004) held in position in your hand (lock torque). While taking the measurement, rotate the reel table (take up reel assembly) on the take up side with your hand so that the reel sensor does not respond.
3) After switching to FF mode, wait for at least 10 seconds and then measure the torque value of the reel table on the take up side. It should be at least 600g/cm (lock torque).
4) After switching to PLAY mode, wait for at least 10 seconds and then measure the torque value of the reel table on the take up side. It should be between 80 and 140g/cm (lock torque).

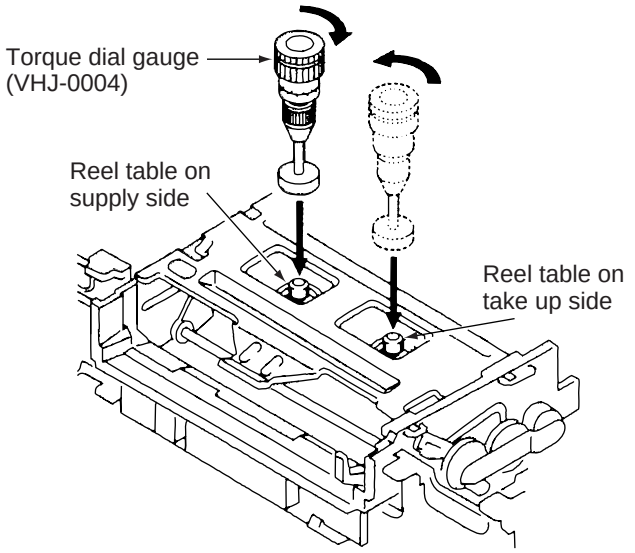


Fig. 4-1-1

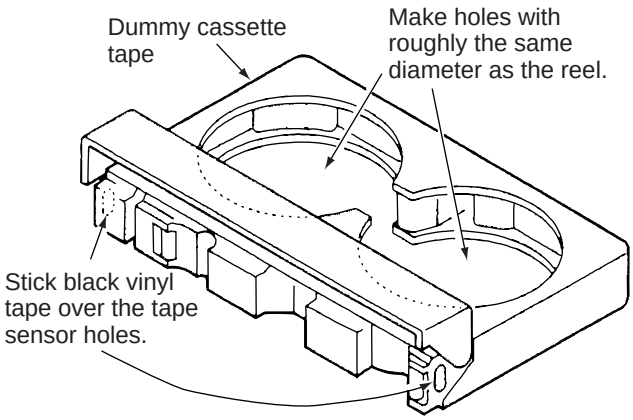


Fig. 4-1-2

4-2. ADJUSTING THE BT LEVER ASSEMBLY POSITION AND CHECKING THE BACK TENSION TORQUE IN PLAY MODE

4-2-1. BT LEVER POLE POSITION ADJUSTMENT (See Fig. 4-2-1)

1) Without loading a cassette tape, put the mechanism into PLAY mode (turn the power switch OFF).
2) Adjust point Ⓐ on the band brake assembly by rotating it so that the tip of the BT lever assembly is aligned with the line on the left side of the mechanism chassis.
3) Refer to section 4-2-2 and check that the back tension torque is between 30 and 50g/cm.

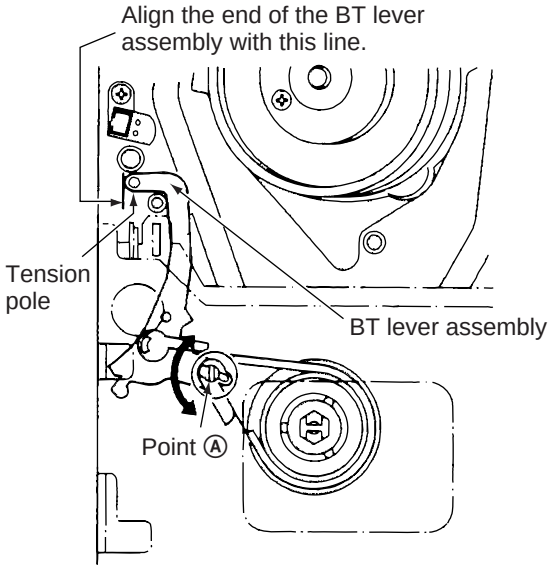


Fig. 4-2-1

4-2-2. CHECKING THE BACK TENSION TORQUE PLAY MODE

1) Mount the cassette torque meter (VHJ-0016) and switch to PLAY mode.
2) Check that the back tension torque is between 30 and 50g/cm .

4-3. TAPE PATH ADJUSTMENT

In normal circumstances, the tape path system does not need to be adjusted. However, after removing or replacing one of the parts shown in Fig. 4-3-1, you should check and adjust the tape path. The adjustment of the tape path is carried out while monitoring the envelope waveform of the video head output, using an oscilloscope. To make sure that the tape drawn off the reel runs freely and without excessive tension along all the tape guides and cylinders (drums), it is also important to check each tape guide by eye.

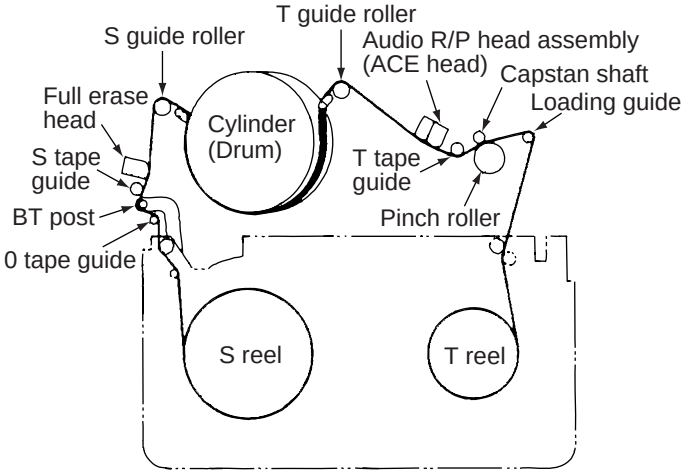


Fig. 4-3-1

4-3-1. ADJUSTMENT PROCEDURE

1. Select a PAL or NTSC alignment tape or blank cassette tape, according to the transmission system of the VCR you are repairing.

NTSC: For models with 525 scanning lines and a field frequency of 60Hz
PAL: For models with 625 scanning lnes and a field frequency of 50Hz

2. Clean the tape guides, the cylinder(drum), the capstan Shaft, the audio R/P head (ACE head) and the full erase head.
3. Using an oscilloscope, adjust the height of the guide roller and carry out horizontal position adjustment, height adjustment and azimuth adjustment on the audio R/P head (ACE head). When observing the envelope waveform, bring the CH-1 probe into contact with the envelope waveform test point, and bring the CH-2 probe into contact with the switching pulse (SW P) test point. While adjusting the tape path, set the trigger at the low side of the switching pulse (SW P) in order to observe the output waveform on the CH-1 side of the video head.

NOTE:The contact point for the oscilloscope varies from one model to another, so to find the correct point for your model, refer to the figure entitled “Test point for tape path adjustment” in the electrical circuit section of the service manual.

4. When checking the tape path by eye, use a dental mirror.

4-3-2. LOAD LEVER ASSEMBLY HEIGHT ADJUSTMENT (See Fig. 4-3-2)

1. Refer to sections 3-9-2, and remove the opener mountIng .
2. Position the height adjustment tool (VHJ-0102) ③ under the full surface of the protrusion ② on the load lever assembly ①, as shown in Fig. 4-3-2.
3. Using your firlgers, gently screw the adjustment nut ④ clockwise into the nut box (VHJ-0048) ⑤ until the protrusion ② of the load lever assembly ① touches the height adjustment tool (VHJ-0102) ③ and the screw starts to feel tight. Next, loosen the adjustment nut ④ by 270° anticlockwise.
4. Load a cassette tape (NTSC: T-160, PAL: E-240) and switch to PLAY mode. Check that when you do this, no scratches appear on the upper or lower edges of the tape. If scratches do appear, re-adjust the height.

Arrange the equipment so that the whole surface of the projection on the load lever assembly is positioned over the height adjustment tool (VHJ-0102) when seen from directly overhead.

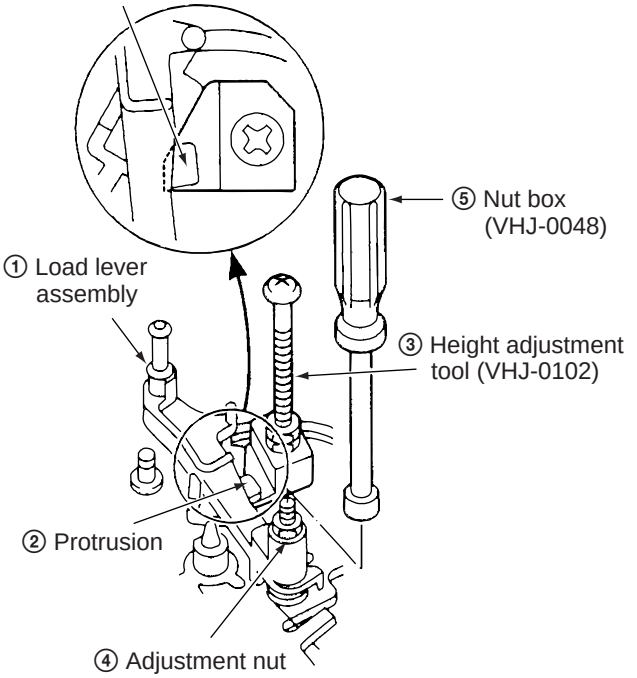


Fig. 4-3-2

4-3-3. GUIDE ROLLER HEIGHT ADJUSTMENT (See Figs. 4-3-3 and 4-3-4)

1) Play the Alignment Tape (NTSC: VHJ-0006, PAL: VHJ-0009) and check that the envelope waveform is at its maximum at the tracking centre. Then, after loosening the S guide roller and the T guide roller by rotating them anticlockwise, tighten them in turn until the envelope waveform becomes flat. If the envelope waveform is not at its maximum at the tracking centre, refer to section 4-3-4 and carry out a rough adjustment of the horizontal position of the audio R/P head (ACE head) before adjusting the guide rollers.
2) Adjust the S guide roller.
   ① Press the tracking button (Channel –), and check whether, when the envelope waveform has reached 50% of its maximum, the front half of the envelope waveform is flat. If not, fine-tune the S guide roller as follows.
   a. If the front half of the envelope waveform is as shown in Fig. 4-3-4 (a), this means that you have pressed the S guide roller too far. Therefore, loosen it slightly, and when it is in the state shown in Fig. 4-3-4 (b), tighten it again, stopping when the envelope waveform is flat.
   b. If the front half of the envelope waveform is as shown in Fig. 4-3-4 (b), this means you have not pressed the S guide roller far enough. Therefore, tighten it slightly, stopping when the envelope waveform becomes flat.
   c. If the front half of the envelope waveform is as shown in Fig. 4-3-4 (c), it may happen that when you tighten the S guide roller, the wrapper waveform does not disappear, but sinks into the flat part, as shown in Fig. 4-3-4 (d). If this happens, the status shown in Fig. 4-3-4 (c) is normal, so loosen the S guide roller, then tighten it again until the envelope waveform is as shown in Fig. 4-3-4 (c).
   ② Check that at the tracking centre, the output of the front half of the envelope waveform is not less than 80% of the maximum.
   ③ Rotate the S guide roller 20° anticlockwise.
3) AdjusttheTguide roller.
   ① press the tracking button (channel –) and check whether, when the envelope waveform is 50% of maximum, the back half of the envelope waveform is flat. If not, loosen the T guide roller slightly, then tighten it gradually until the back half of the envelope waveform becomes flat.
   ② Check that the output for the back half of the envelope waveform is at its maximum at the tracking centre.
4) Check that the envelope waveform does not fluctuate when you switch from F-SEARCH to PLAY or from R-SEARCH to PLAY. If it does fluctuate, repeat steps 3) and 4).

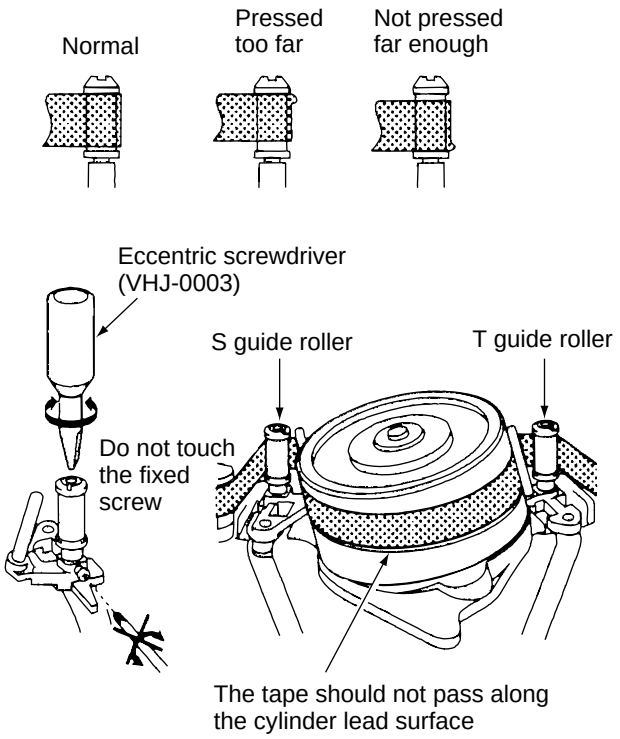

Normal
Pressed too far
Not pressed far enough
Eccentric screwdriver (VHJ-0003)
S guide roller
T guide roller
Do not touch the fixed screw
The tape should not pass along the cylinder lead surface

Fig. 4-3-3

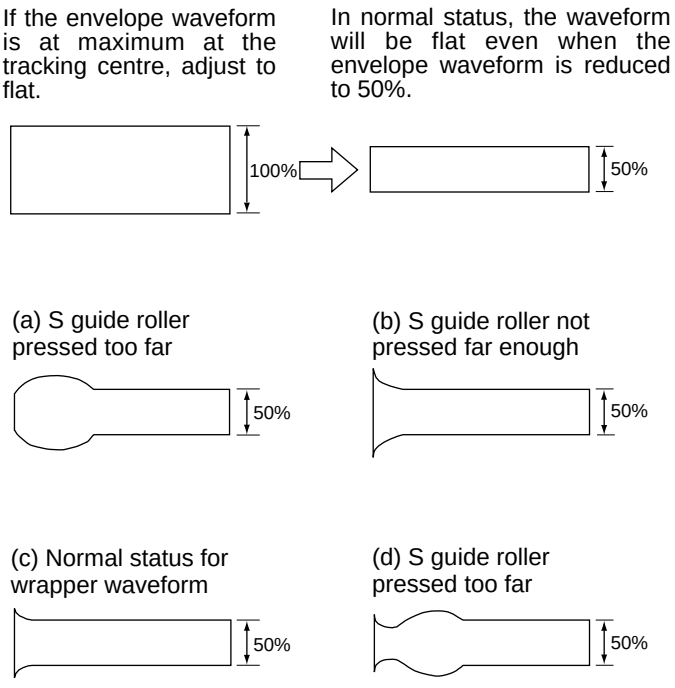

If the envelope waveform is at maximum at the tracking centre, adjust to flat.
In normal status, the waveform will be flat even when the envelope waveform is reduced to 50%.
100%
50%
(a) S guide roller pressed too far
50%
(b) S guide roller not pressed far enough
50%
(c) Normal status for wrapper waveform
50%
(d) S guide roller pressed too far
50%

Fig. 4-3-4

4-3-4. AUDIO R/P HEAD (ACE HEAD) HEIGHT ADJUSTMENT, AZIMUTH ADJUSTMENT AND HORIZONTAL POSITION ADJUSTMENT

(I) Azimuth adjustment (See Fig. 4-3-5)

1) Play the alignment tape (NTSC: VHJ-0005, PAL: VHJ-0008) and observe the waveform of the audio output, using an oscilloscope.
2) Loosen the height adjustment screw in the counter-clockwise direction and decrease the amplitude of the audio output waveform. In this state, tighten the screw in the clockwise direcion and maximize the amplitude. Slightly tighten the screw further in the clockwise direction and decrease the amplitude, and then loosen it slowly in the counterclockwise direcion until the amplitude starts to reach the maximum.
3) Set the amplitude of the audio output waveform to maximum by rotating the azimuth adjustment screw.
4) Make sure that the tape edge is running between the top of the audio head and the bottom of the control head.
   Gaps A and B should be roughly equal.

NOTE: Rotate the adjustment screw with a slotted screw-driver. Do not apply excessive force vertically. As the height adjustment screw also adjusts tilt, rotate it slowly. Do not rotate it excessively. And apart from the this screw, and height adjustment screw, the screws is precisely adjusted before shipment from the factory, and should not be tampered with. Tampering with these screws can lead to scratching of the tape and other problems.

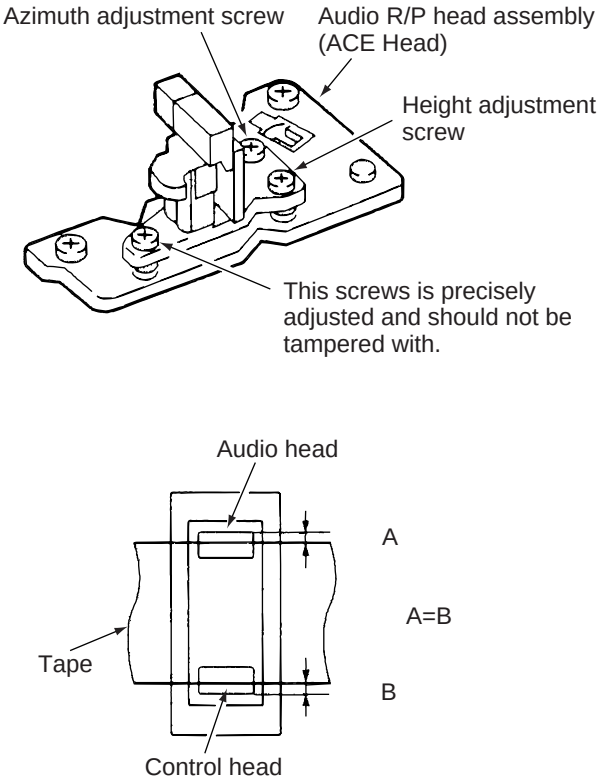


Fig. 4-3-5

(2) Horizontal position adjustment (See Fig. 4-3-6)

1) Play the alignment tape (NTSC: VHJ-0006, PAL: VHJ-0009).
2) Press the tracking buttons (channel + and channel –) simultaneously and set the tracking to the centre.
3) Using an oscilloscope, observe the waveform of the video head output.
4) Loosen the two fixed screws on the audio R/P head (ACE head) by between 20° and 30° anticlockwise.
5) Using a slotted screwdriver, adjust the position of the audio R/P head (ACE head). At the position where the amplitude of the envelope waveform is at its maximum at the tracking centre, tighten the fixed screw on the audio R/P head (ACE head). When you do this, check that the envelope waveform changes equally whether the tracking is shifted by pressing the tracking button in the plus or the minus direction.
6) Play the alignment tape (NTSC: VHJ-0007 PAL: VHJ-0052) and check that the amplitude of the envelope waveform is at its maximum at the tracking centre. If not, repeat steps 1) to 6).
7) Refer to the electrical adjustments section of the service manual, and adjust the switching position of the servo circuit.

NOTE:

1. When you press the tracking buttons (channel+ and channel –) simultaneously, the tracking is reset to the tracking centre. When the tracking is at the tracking centre, the message “T - : - “ will appear in place of the clock display on the front panel. If you keep pressing the channel– button the messages “T- : “ and “T - - : “ will appear, while if you keep pressing the channel + button, the messages “T : - ” and “T : - - “ will appear. Three seconds after you stop pressing the tracking buttons, the clock displav will re-appear.
2. The check described in paragraph 6) is not necessary for models in which the only tape speed is SP mode.

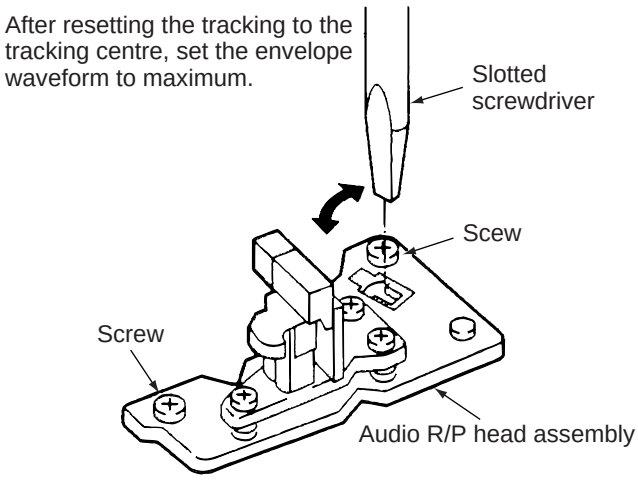

After resetting the tracking to the tracking centre, set the envelope waveform to maximum.
Slotted screwdriver
Scew
Screw
Audio R/P head assembly

Fig. 4-3-6

4-3-5. CHECKING AFTER ADJUSTMENT

1) Play the alignment tape (NTSC:VHJ-0006, PAL:VHJ-00 09) and check that the envelope waveform is activated immediately and that there are no fluctuations in the envelope waveform or the audio output waveform.
2) Load a cassette tape (NTSC:T-120, PAL: E-180) and use it to record and replay. Check that the envelope waveform is activated immediately and that there are no fluctuations in the envelope waveform or the audio output waveform. (When recording on the tape, input 1kHz to the audio input terminal. Use a scratch-free cassette tape (NTSC: T-120, PAL: E-180).) Check that at the tracking centre, the front half down and back half down are not more than 20% of the value at the point where the envelope waveform amplitude is at its maximum.
3) Check that the envelope waveform is activated immediately when you switch from PLAY to R-SEARCH or from R-SEARCH to PLAY. Check that there is no slack in the tape next to the pinch roller.
4) Check that the envelope waveform is activated immediately when you switch to PLAY from FF, REW, F-SEARCH, R-SEARCH or STOP mode. Check that there is no slack in the tape next to the pinch roller.
5) Check that the tape is not curling or riding up on the upper or lower flanges of the tape guides in PLAY, FF, REW, F-SEARCH or R-SEARCH modes.
6) Check that in PLAY mode. the tape runs as shown in Fig. 4-3-7.
7) Load a tape (NTSC:T-160, PAL: E-240) and play it back. carry out the checks described in steps 3) to 5) above.

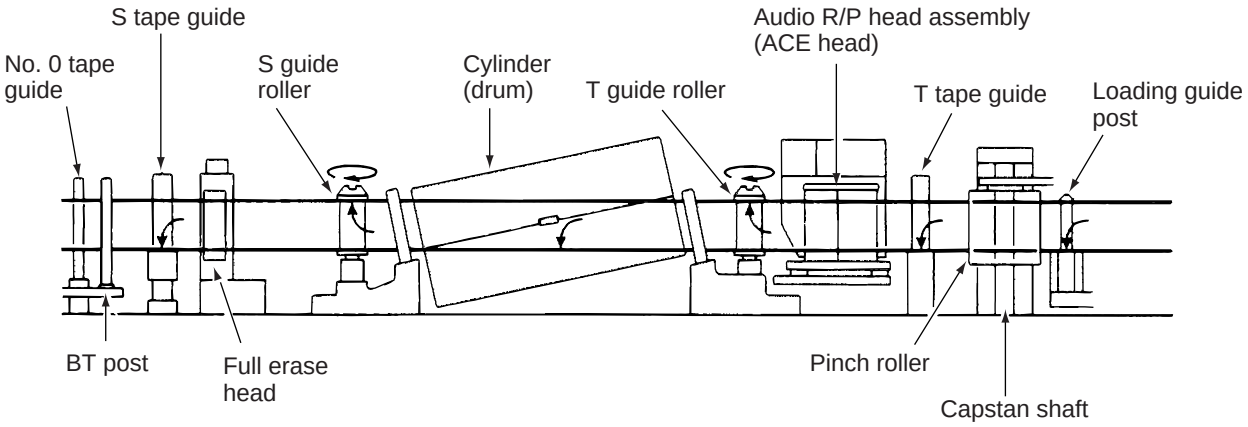
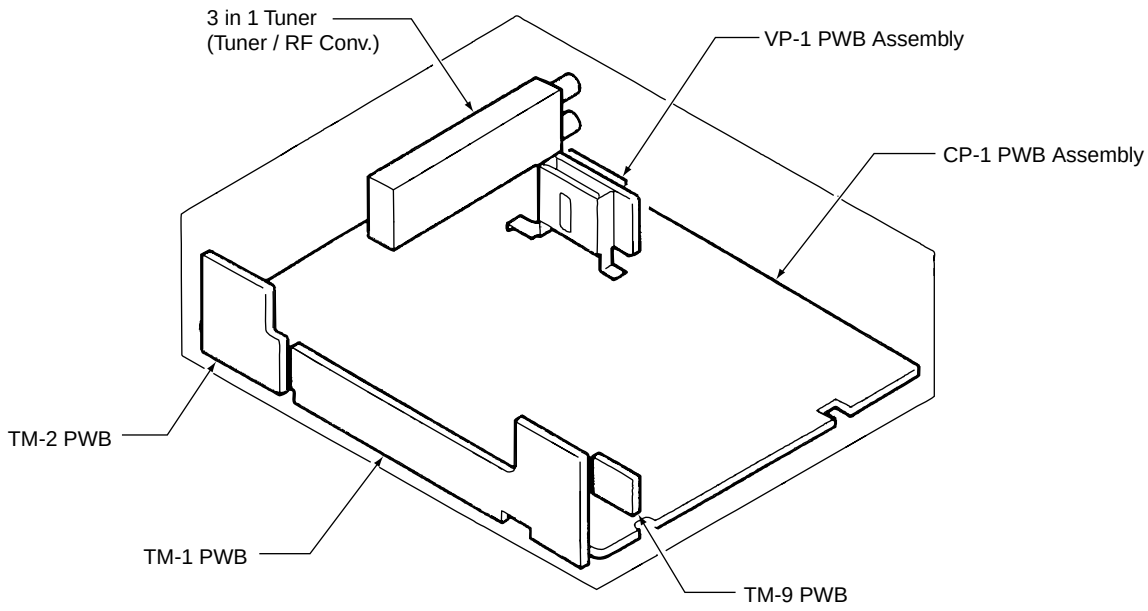


Fig. 4-3-7

SECTION 6
ELECTRICAL ADJUSTMENTS

CIRCUIT BOARDS LOCATION

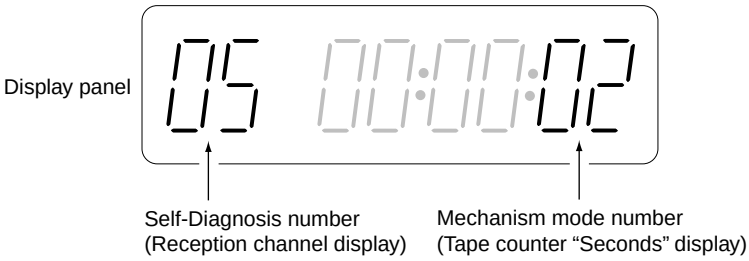


SELF-DIAGNOSIS DISPLAY

This unit displays the diagnosis contents of abnormalities and the mechanism mode on its display panel in 2-digit numbers. These display shows the outline of the problems. Use it as a reference when servicing the unit.

1. Self-Diagnosis Contents and Mechanism Mode Display

- When the STOP button on the remote control is pressed for about 10 seconds continuously, the self- diagnosis number will be displayed on the reception channel display of the display panel and number indicating the failed mechanism mode (changed mode when being shifted) on the tape counter “seconds” display for 10 seconds each.
- During self-diagnosis display, displays other than the diagnosis number/mechanism mode number will be turned off and when displays end, the normal display will be returned automatically.
- Refer to “Self-Diagnosis Contents” for the self-diagnosis numbers and the “Mechanism Mode Display Contents” for the mechanism mode numbers.
- When the “0” button on the remote control unit is pressed during display, and clearing the self-diagnosis display and mechanism mode display.



Self-Diagnosis Contents

No.	Problem	Main Possible Cause	Mechanism Operations and State After Occurrence
00	There is no abnormality in the mechanism.		
01	The cylinder motor does not rotate.	• The cylinder motor is faulty. • The control of the cylinder motor is faulty. • The tape winds around the cylinder.	Shifts to the STOP mode.
02	The take-up reel does not rotate.	• The take-up reel is caught. • The reel belt is faulty. • The take-up torque has decreased.	Shifts to the STOP mode.
03	The capstan motor does not rotate.	• The capstan motor is faulty. • The control of the capstan motor is faulty .	Shifts to the STOP mode.
04	The tape cannot be loaded with the cassette inserted. (But unloading can be performed.)	• Error in the operations of the tape loading mechanism. • Foreign particles in the tape loading mechanism. • The tape end sensor is faulty. • The reel brake of the tape cassette has not been released.	Unloads, shifts to the INITIAL mode, and the power goes off.
05	Tape loading and unloading cannot be performed with the cassette inserted.	• The tape guide is caught. • The loading motor is faulty. • The control of the loading motor is faulty.	The power is forcibly turned off with the mechanism at its current position.

No.	Problem	Main Possible Cause	Mechanism Operations and State After Occurrence
06	Front unloading cannot be performed when ejecting the cassette. (Front loading can be pertormed.)	• The cassette drive mechanism is faulty . • The front door is caught.	Front loads and shifts to the STOP or INITIAL mode. • When the power switch is turned on before eject operations: Shifts to the STOP mode. • When the power switch is turned off before eject operations: Shifts to the INITIAL mode and the power goes off.
07	Front loading and front unloading cannot be performed when ejecting the cassette.	• The tape cassette is caught in the cassette drive mechanism. • The main cam and front rack gear of the front loading mechanism have not engaged properly. • The gears of the front loading drive mechanism have not engaged properly.	The power is forcibly turned off with the mechanism at its current position.
08	The mechanism becomes 1(REVIEW) while moving from 2 (IDLER), 3 (STILL), 4 (BRAKE), and to 5 (STOP).	• The mechanism mode switch contact is faulty.	The power is forcibly turned off with the mechanism at its current position.
09	The mechanism becomes 7 (INITIAL) while moving from 1 (REVIEW), 2 (IDLER), 3(STILL), 4 (BRAKE), and to 5 (STOP).	• The mechanism mode switch contact is faulty.	Carries out tape take-up operations, shifts to the INITIAL mode, and the power goes off.

Note: For details of mechanism operations corresponding to the mechanism positions of the self-diagnosis numbers 08 and 09 above, refer to the separate volume on the V95 I mechanism manual.
These manual reference numbers are shown in the cover.

Mechanism Mode Display Contents

Mode No.	Mechanism Mode	Mode No.	Mechanism Mode	Mode No.	Mechanism Mode
00	CASSETTE OUT	08	PLAY	16	VIDEO INSERT
01	STANDBY	19	REC	17	VIDEO INSERT – PAUSE
02	STOP	10	AUDIO DUBBING	18	AUDIO/VIDEO INSERT
03	STILL	11	X2 SPEED PLAY	19	REVERSE X2 SPEED PLAY
04	REC-PAUSE	12	CUE		
05	AUDIO DUBBING – PAUSE	13	REVIEW		
06	FRAME ADVANCE	14	FAST FORWARD		
07	SLOW	15	REWIND	99	OTHERS

2. ELECTRICAL ADJUSTMENT

VCR PRESETTING

This VCR need three basic presetting by using the menus displayed on-screen. After all connection have been made, then follow steps 1 to 3 to preset the VCR.
The three presetting steps will be displayed in sequence on TV screen. The setting are entered with the remote control.

Turn on the VCR

1. Adjusting the TV receiver to the video channel: The AUTO SET-UP screen will appear. When the video channel has been preset, press the EXECUTE button on the remote control.
2. Country selection: Using the numeric button, select the country of use.
3. Language selection: When the desired language has been select, press the MENU button directly before prevent auto tuning will start.

When steps 1 to 3 have been finish, ready to operate the all operating mode.

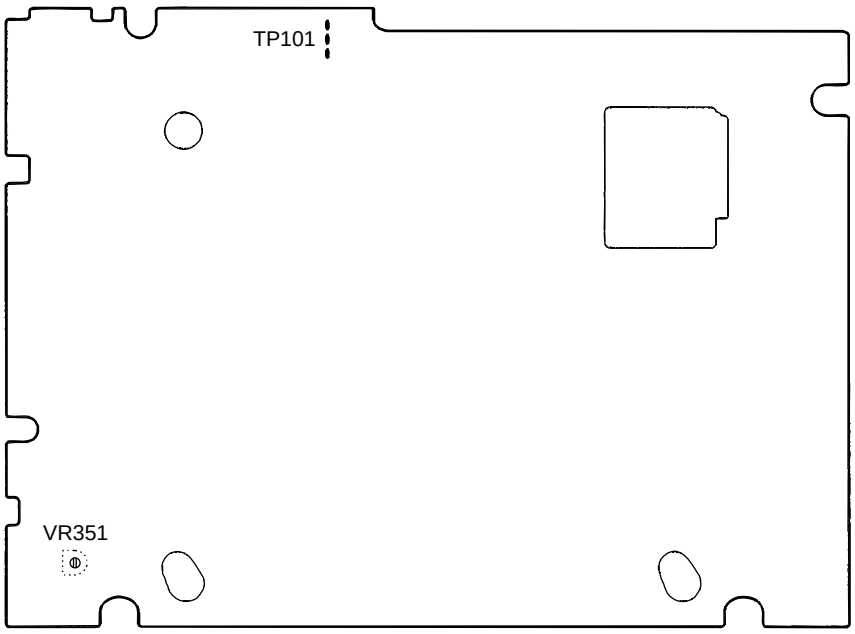
2-1. SERVO CIRCUIT ADJUSTMENT

- These adjustments should be done upon completion of the tape transport adjustments.
- If the tape transport adjustments (except the tilt adjustment) are done after these adjustments, follow the procedures again in section 2-1-3, “switching position adj.”
- When a cassette tape is loaded, auto-tracking will be set immediately after starting the first playback. To adjust servo circuit, set back to the manual tracking condition, and set the tracking to the center position.

2-1-1 . TEST EQUIPMENT AND STANDARDS REQUIRED

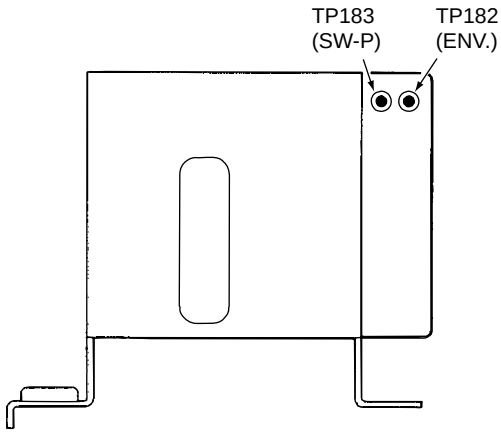
Color Bar Signal Generator	PAL Color bar signal with 100% white level (EBU color bar signal)	
Oscilloscope	Vertical sensitivity	: 5 mV/DIV, external trigger
	Bandwidth	: more than 10 MHz
Alignment Tape	VHJ-0009 or VHJ-0023	: SP mode, monoscope. 6 KHz
Blank Tape	VHS-type cassette tape	
Monitor TV		

2-1-2. LOCATION OF ADJUSTMENT POINTS



CP-1 PWB (Foil side)

Fig. 2-1-1



VP-1 PWB Assembly

Fig. 2-1-2

Note:
• Self-recording means “Record any broadcasting or video signal and play back the just-recorded portion.”

2-1-3. SWITCHING POSITION ADJ.

Measuring Point	Measuring Equipment	Adj. Condition
TPIO1 (VIDEO OUT) TP183 (SW-P)	Oscilloscope	PLAY mode Alignment tape (VHJ-0009 or VHJ-0023)

Adj. Location	Adj. Value
VR351 (SW-P)	6.5 H ± 0.5 H

1. After ejecting the cassette tape, load the alignment tape.
2. Within two seconds after the playback screen is displayed. press the remote control tracking buttons (▲) once, and cheak that the ATR display goes off.
3. Press the remote control tracking button (▼) once and set the tracking to the center.
   Note: Do not press the tracking buttons (▲) and (▼) continuosly.
4. Adjust VR351 (SW-P) so that the width of “ T ” becomes 6.5 H ± 0.5 H as shown in Fig. 2-1-3.

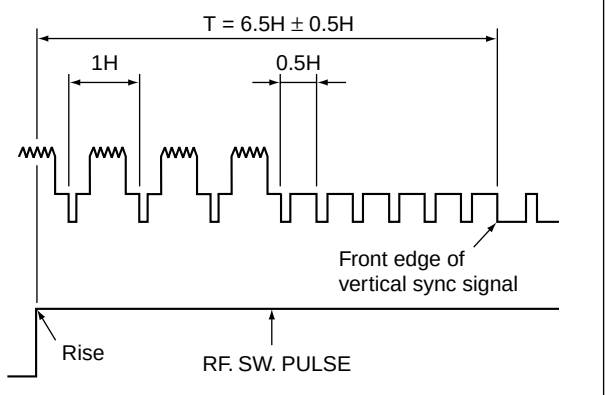


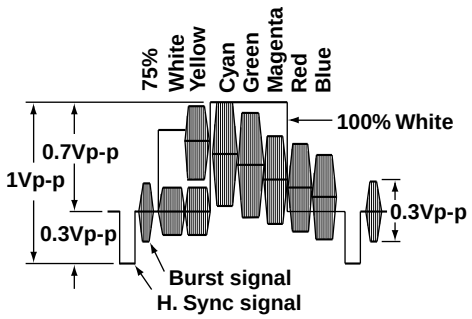
Fig. 2-1-3

2-2. VIDEO CIRCUIT RELAY JIG

2-2-1 .TEST EQUIPMENT AND STANDARDS REQUIRED

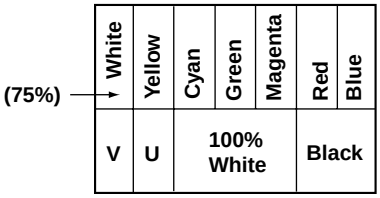
Color Bar Signal Generator	PAL Color bar signel with 100% white level (EBU color bar signel)	
Oscilloscope	Vertical sensitivity Bandwidth	: 5 mV/DIV, external trigger : more than 10 MHz
Oscilloscope Probe	Input capacity Covering frequency	: less than 25 pF (10:1) less than 40 pF (1:1) : DC ~ 40 MHz (10:1) DC ~30 MHz (1:1)
Digital Voltmeter	DC range	
Alignment Tape	VHJ-0008 or VHJ-0023 (Color bar signal waveform is described below. Refer to Fig. 2-2-1)	: SP mode, color bar. 1 kHz
Relay Jig	VHJ-0065 VHJ-0066	: 5-wire flat cable for VP-1 PWB assembly (2 head model) : 7-wire flat cable for VP-1 PWB assembly (4 head model)

ALIGNMENT TAPE COLOR BAR SIGNAL



Color bar signal waveform (VHJ-0008)

Fig. 2-2-1



Color bar pattern (VHJ-0008) on monitor TV

Fig. 2-2-2

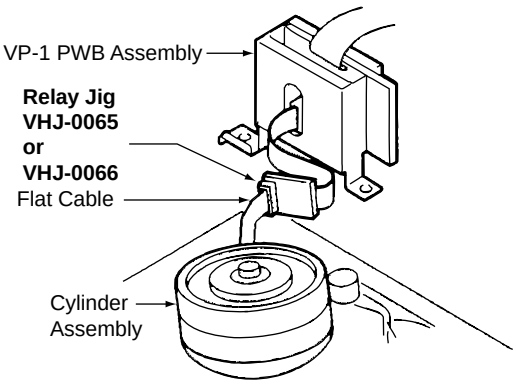


Fig. 2-2-3

RELAY JIG

Connect the flat cable end from the cylinder assembly to the VP-1 PWB assembly using the relay jig to provide simple repairing of the VP-1 PWB assembly, as shown in Fig. 2-2-3. Further, when adjusting the VP-1 PWB assembly, be sure to make contact an end of shield case with bracket of the VP-1 PWB assembly to maintain the shield effect. If the VP-1 PWB assembly does not contact, there is insufficient ground and no proper play back image can be obtained.

2-3. IF CIRCUIT ADJUSTMENT

- In this model, the circuits of the TUNER, IF, and RF converter have been made into one. Therefore, should one circuit malfunction, the whole unit must be replaced.
- The adjustments for the IF (RF AGC) circuit of the 3 in 1 tuner are described below.

Note: The 3 in tuner dose not need any adjustments, because precise adjustments were down before shipment.

2-3-1. TEST EQUIPMENT AND STANDARD REQUIRED

Monitor TV	

2-3-2. LOCATION OF ADJUSTMENT POINT

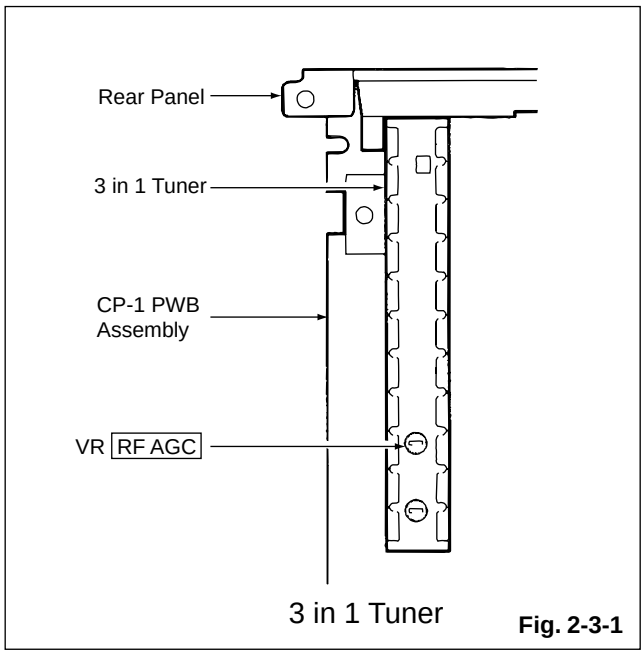


Fig. 2-3-1

2-3-3. RF AGC ADJ.

Measuring Point	Measuring Equipment	Adj. Condition
Picture of monitor TV	Monitor TV	E-E mode
Adj. Location	**Adj. Value**	
VR (RF AGC) (on the 3 in 1 tuner)	S/N is best point	

1. Connect the monitor TV to the VHF/UHF antenna output terminal.
2. Connect the VHF or UHF antenna to the VHF/UHF antenna input terminal.
3. Receive the middle electrical field (70 dBμ ~90 dBμ) of the VHF or UHF channel, and slowly turn the VR (RF AGC) from the point where snow-noise is present to the point where it just disappears from the monitor TV.
4. Confirm by monitor TV that there is no beat and saturation (S/N is best point) when receiving any TV channel.

3. TEST POINTS FOR TAPE PATH ADJUSTMENT

Test points TP182 (ENV) and TP183 (SW-P) for tape path adjustment are shown in figure below.

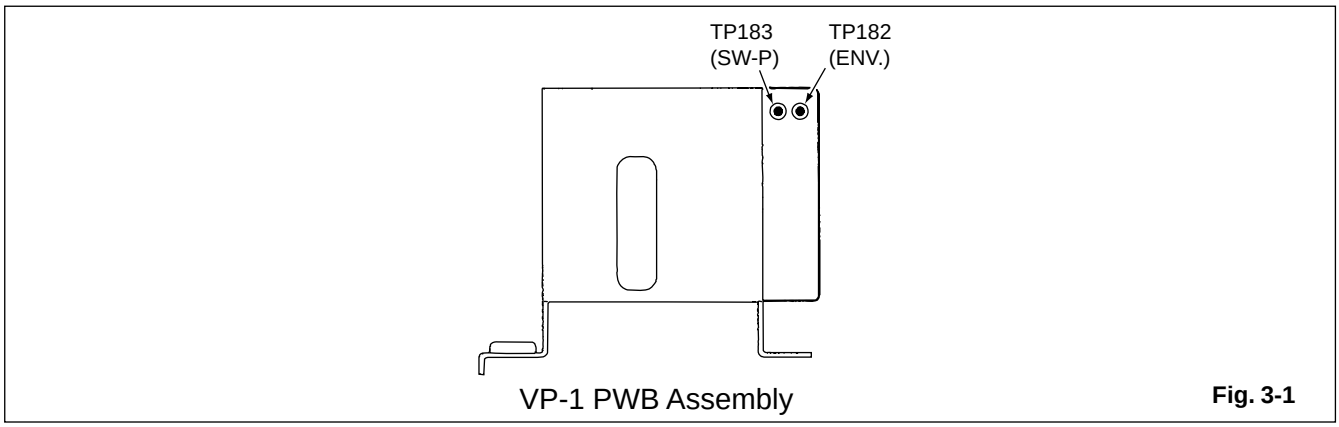


Fig. 3-1

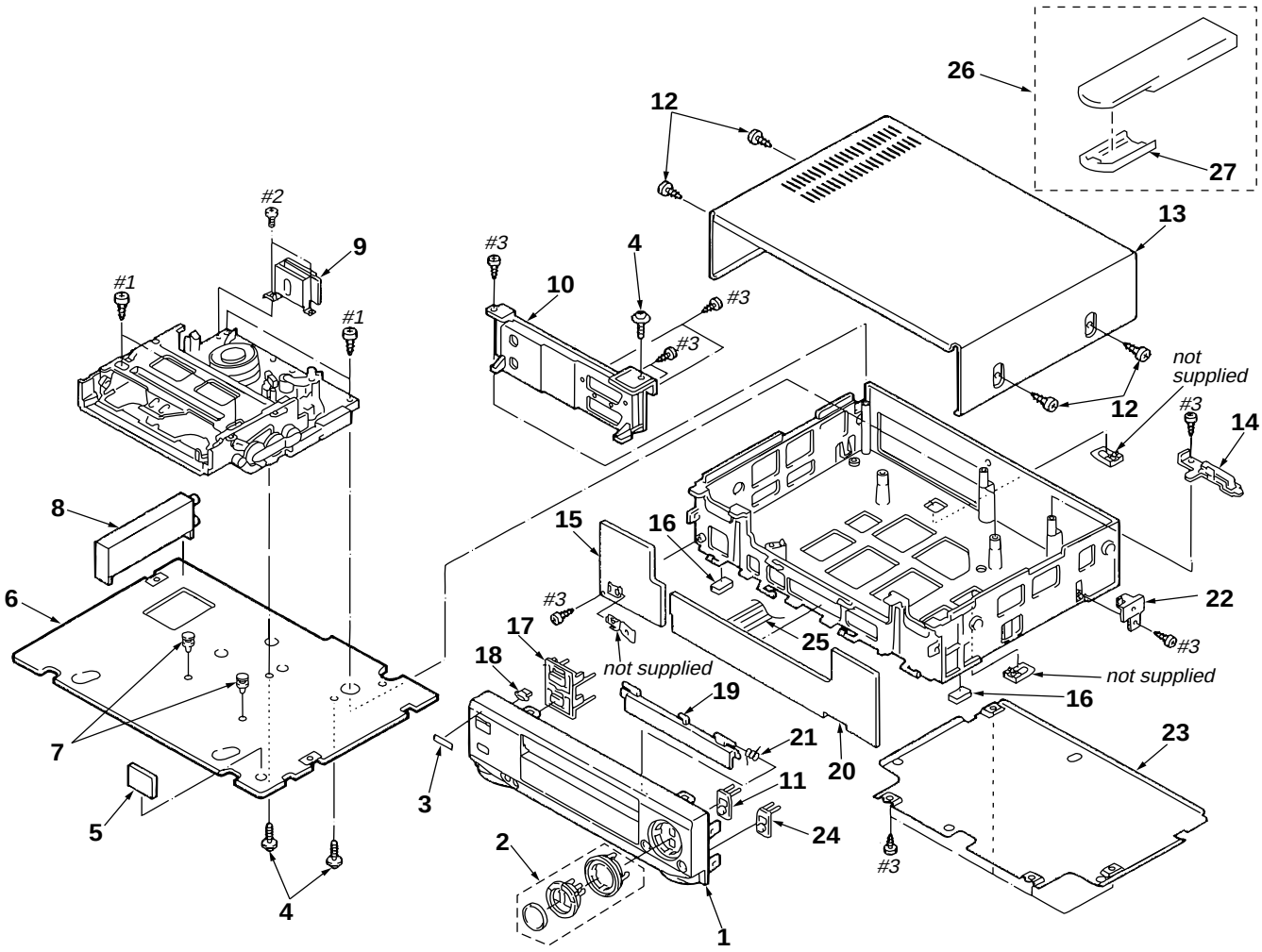
SECTION 7
EXPLODED VIEWS

NOTE :

- -XX, -X mean standardized parts, so they may have some difference from the original one.
- The construction parts of an assembled part are indicated with a collation number in the remark column.
- Items marked " * "are not stocked since they are seldom required for routine service. Some delay should be anticipated when ordering these items.
- The mechanical parts with no reference number in the exploded views are not supplied.
- Hardware (# mark) list and accessories and packing materials are given in the last of this parts list.

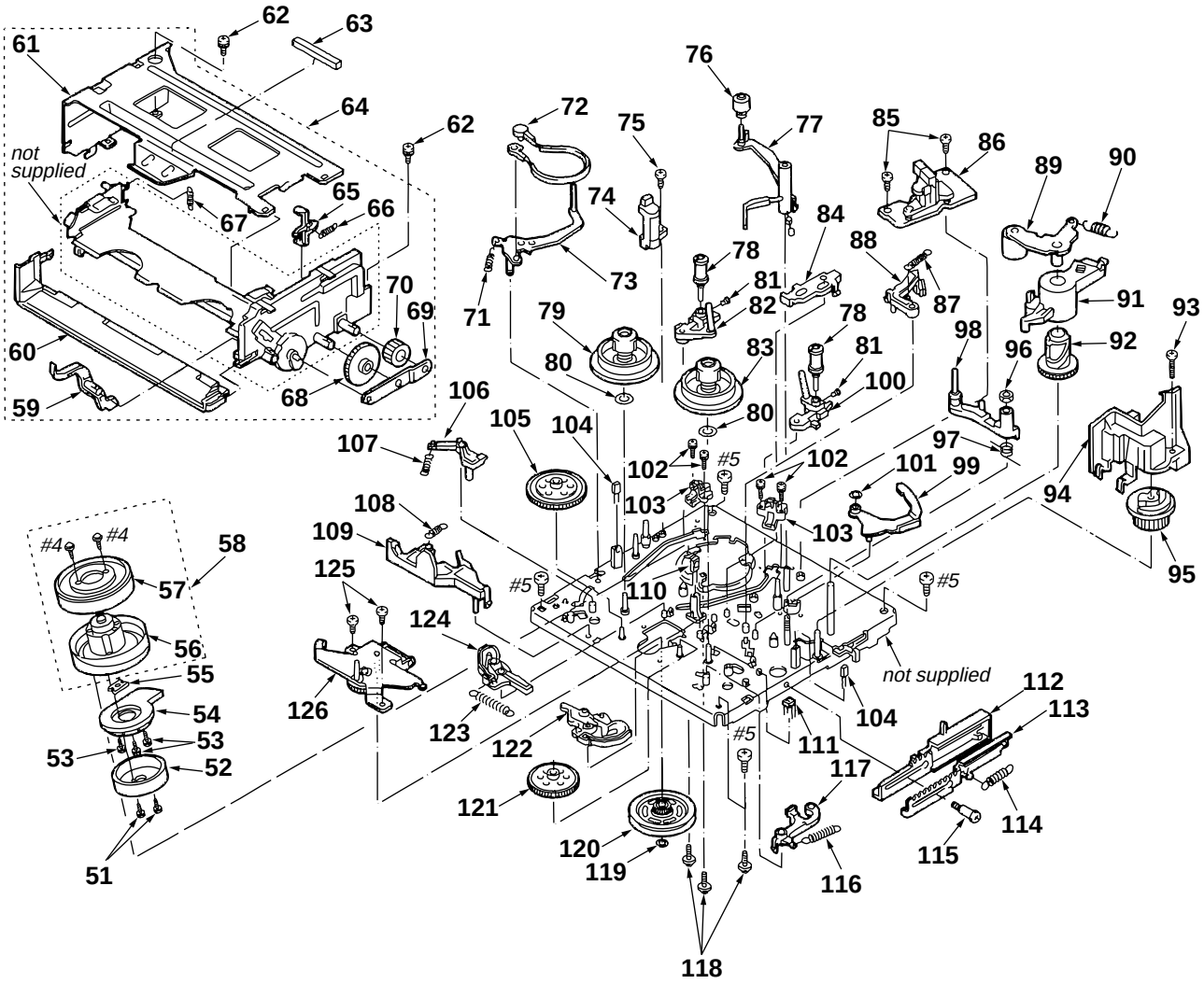
The CP-A board and CP-1 board are identical.

7-1. CABNET & CHASSIS PARTS



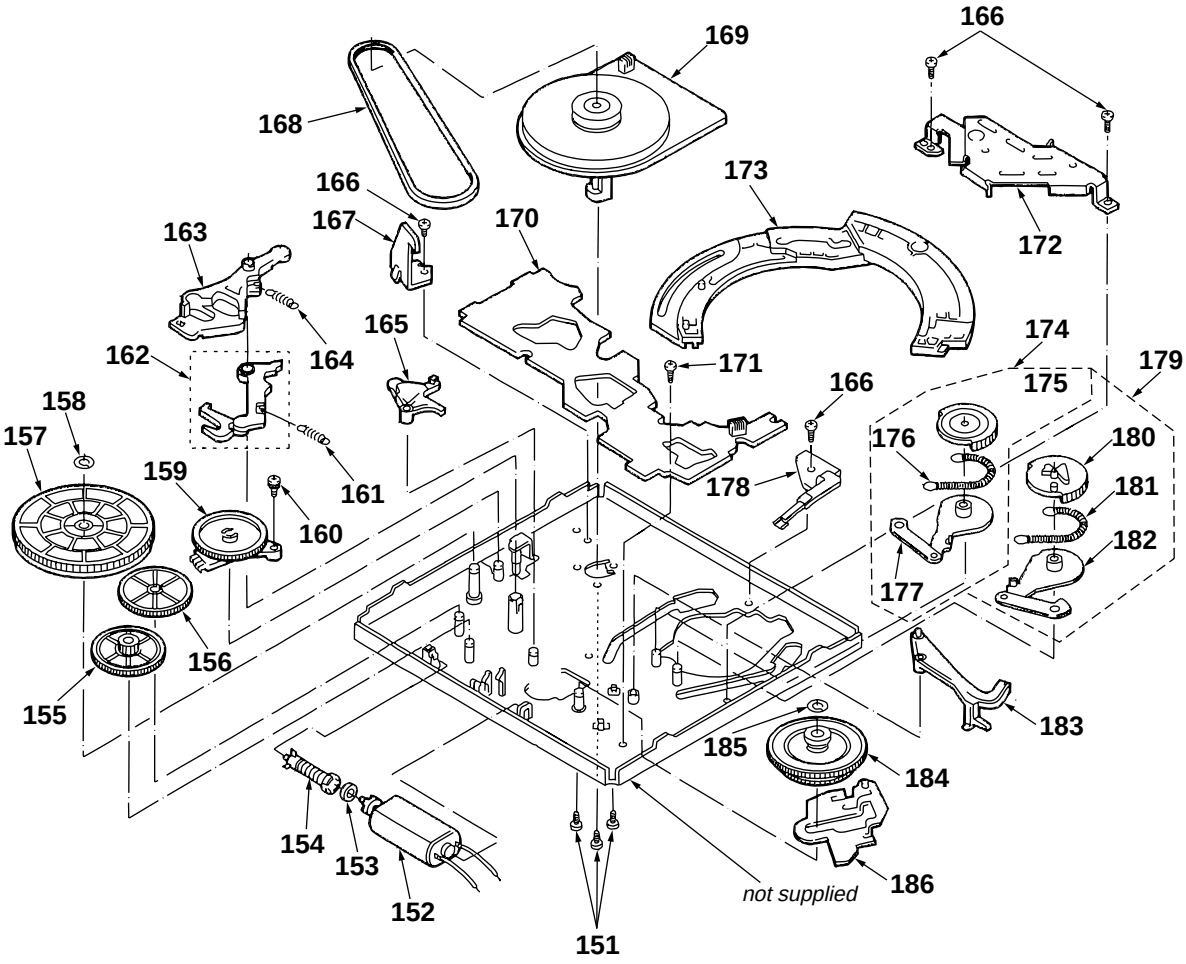
Ref. No.	Part No.	Description	Remark
1	A-6780-487-A	CABINET ASSY, FRONT (E280 Series)	
1	A-6780-489-A	CABINET ASSY, FRONT (E220 Series)	
1	A-6780-499-A	CABINET ASSY, FRONT (E270 Series)	
1	A-6780-506-A	CABINET ASSY, FRONT (E120AE)	
2	A-6780-461-A	BUTTON ASSY BOARD, COMPLETE	
3	3-942-768-02	EMBLEM (NO.5), SONY	
4	3-965-446-01	SCREW, SPECIAL	
* 5	A-6796-530-A	TM-9 BOARD, COMPLETE (E220VP1,VP2,E270VC1,VC2,E280UX,VC1,VC2)	
* 6	A-6796-554-A	CP-A BOARD, COMPLETE (E280UX)	
* 6	A-6796-560-A	CP-A BOARD, COMPLETE (E220VP1)	
* 6	A-6796-566-A	CP-A BOARD, COMPLETE (E280VC1)	
* 6	A-6796-570-A	CP-A BOARD, COMPLETE (E280VC2)	
* 6	A-6796-572-A	CP-A BOARD, COMPLETE (E280CP)	
* 6	A-6796-581-A	CP-A BOARD, COMPLETE (E270VC1,VC2)	
* 6	A-6796-591-A	CP-A BOARD, COMPLETE (E270CP)	
* 6	A-6796-594-A	CP-A BOARD, COMPLETE (E220UY)	
* 6	A-6796-599-A	CP-A BOARD, COMPLETE (E220AE)	
* 6	A-6796-602-A	CP-A BOARD, COMPLETE (E220VP2)	
* 6	A-6796-604-A	CP-A BOARD, COMPLETE (E120AE)	
7	3-952-522-01	FIXER	
8	1-693-358-11	TUNER (RF/TU/IF)(EXCEPT E220UY,E280UX)	
8	1-693-375-11	TUNER (RF/TU/IF)(E220UY,E280UX)	
* 9	A-6796-535-A	VP-1 BOARD, COMPLETE (E120AE,E220AE,VP1,VP2,E270 Series)	
* 9	A-6796-558-A	VP-1 BOARD, COMPLETE (E220UY,E280 Series)	
* 10	3-975-635-01	BRACKET, TERMINAL (E120AE,E220UY,VP1,VP2)	
* 10	3-974-755-01	BRACKET, TERMINAL (E270 Series,E280CP,VC1,VC2)	
* 10	3-975-127-01	BRACKET, TERMINAL (E280UX)	
11	3-979-904-01	BUTTON (PAUSE)	
12	3-740-382-01	+BTS-B S 4X12	
* 13	3-963-652-01	COVER, TOP	
14	3-963-641-01	HOLDER (AC INLET)	
* 15	A-6796-533-A	TM-2 BOARD, COMPLETE (E280 Series)	
* 15	A-6796-541-A	TM-2 BOARD, COMPLETE (E220 & E270 Series)	
* 15	A-6796-633-A	TM-2 BOARD, COMPLETE (E120AE)	
16	3-942-661-01	STAND, FELT	
17	3-974-743-01	BUTTON 2P (POWER EJECT)	
18	3-947-433-01	WINDOW	
19	3-974-931-01	DOOR, CASSETTE (E280CP)	
19	3-975-488-01	DOOR, CASSETTE (E280UX)	
19	3-975-490-01	DOOR, CASSETTE (E220VP1,VP2)	
19	3-975-491-01	DOOR, CASSETTE (E280VC1,VC2)	
19	3-975-492-01	DOOR, CASSETTE (E220UY)	
19	3-975-493-01	DOOR, CASSETTE (E220AE)	
19	3-975-495-01	DOOR, CASSETTE (E120AE)	
19	3-975-497-01	DOOR, CASSETTE (E270VC1,VC2)	
19	3-975-498-01	DOOR, CASSETTE (E270CP)	
* 20	A-6796-532-A	TM-1 BOARD, COMPLETE	
21	3-960-936-01	SPRING	
* 22	3-963-642-01	TOP HOLDER COVER	
* 23	3-963-620-01	COVER, BOTTOM	
24	3-974-745-01	BUTTON (REC)	
25	1-777-958-11	CABLE, FLEXIBLE FLAT	
26	1-475-037-41	COMMANDER, STANDARD (RMT-V206C) (E280CP,VC1,VC2)	
26	1-475-037-51	COMMANDER,STANDARD (RMT-V206D) (E280UX)	
26	1-475-038-41	COMMANDER, STANDARD(RMT-V207C) (E220VP1,VP2)	
26	1-475-038-51	COMMANDER, STANDARD(RMT-V207D) (E220AE)	
26	1-475-038-61	COMMANDER, STANDARD(RMT-V207E) (E220UY)	
26	1-475-039-21	COMMANDER, STANDARD(RMT-V207G) (E120AE)	
26	1-475-040-11	COMMANDER, STANDARD(RMT-V207H) (E270 Series)	
27	3-709-128-00	COVER, BATTERY	

7-2. MECHANISM PARTS-1



Ref. No.	Part No.	Description	Remark
51	3-746-760-01	SCREW (2.3X6), SPECIAL	
52	1-698-912-11	MOTOR, ROTOR CYL DC 2W	
53	3-746-761-01	SCREW (2.3X10), SPECIAL	
54	1-698-913-11	MOTOR, STATOR CYL DC 2W	
55	3-735-738-01	SPACER, MOTOR	
56	3-940-516-01	CYLINDER (LWR 2AL) ASSY	
57	3-959-008-01	CYLINDER, UPR, 2N2P-L (E220UY,E280 Sries)	
57	3-974-420-01	CYLINDER (UPR 2N2S-V) (E120AE,E220AE,VP1,VP2,E270CP,VC1,VC2)	
58	A-6762-525-A	CYLINDER ASSY BOARD, COMPLETE (E220UY,E280 Series)	
58	A-6762-533-A	CYLINDER ASSY BOARD, COMPLETE (E220AE,VP1,VP2,E270CP,VC1,VC2)	
58	A-6762-541-A	CYLINDER ASSY BOARD, COMPLETE(E120AE)	
59	3-960-915-01	LEVER, DOOR OPENER	
60	3-960-954-01	FRAME, UNDER	
* 61	3-960-952-01	STAND (L)	
62	3-960-939-01	SCREW (2.6X6), SPECIAL	
63	3-965-758-01	PAD	
* 64	A-6779-276-A	MECHANICAL ASSY, CASSETTE	
65	3-961-302-01	LEVER, RELEASE	
66	3-961-301-01	SPRING, LID OPENER	
67	3-961-303-01	SPRING, LOCK TRAY	
68	3-960-959-01	GEAR, LOCK	
* 69	3-960-916-01	HOLDER, GEAR	
70	3-960-960-01	GEAR, PINION	
71	3-960-977-01	SPRING, BT	
72	3-963-789-01	BAND (ASSY), BRAKE	
73	3-961-016-01	LEVER ASSY, BT	
74	3-971-997-01	HEAD, FULL ERASE	
75	3-960-984-01	SCREW (2.6X10), SPECIAL	
76	3-960-975-01	ROLLER ASSY, CLEANER	
77	3-964-887-01	LEVER, CLEANER	
78	3-735-630-01	ROLLER ASSY, GUIDE	
79	3-963-781-01	REEL (ASSY), SUPPLY	
80	3-735-754-01	WASHER (DIA.3), ADJUSTMENT	
81	3-961-038-01	SCREW (2X3), SPECIAL	
* 82	3-970-883-01	MOUNT (ASSY), S INC LINE	
83	3-963-782-01	REEL (ASSY), TAKE UP	
84	3-961-008-01	SLIDE, T ACT BRAKE	
85	3-966-763-01	SCREW (2.6X12)	
86	A-6779-797-A	HEAD ASSY, R/P ACE	
87	3-961-015-01	SPRING, CAPSTAN BRAKE	
88	3-961-014-01	BRAKE ASSY, CAPSTAN	
89	3-961-024-01	LEVER ASSY, PINCH ROLLER	
90	3-961-026-01	SPRING, PINCH ROLLER	
91	3-973-490-01	MOUNT, LIFT PINCH	
92	3-961-027-01	CAM, LIFT PINCH	
93	3-961-030-01	SCREW (2.6X16), SPECIAL	
94	3-961-029-01	OPENER MOUNT	
95	3-961-028-01	GEAR, CAM PINCH	
96	3-961-045-01	NUT (3X3), SPECIAL	
97	3-961-044-01	SPRING, L GUIDE LEVER	
98	3-966-764-01	LEVER ASSY, ROAD	
99	3-964-886-01	LEVER (ASSY), ACT L GUIDE	
* 100	3-970-884-01	MOUNT (ASSY), T INC LINE	
101	3-740-367-01	WASHER, SLIT	
102	3-960-951-01	SCREW (2.6X10), SPECIAL	
103	3-970-880-01	CATCHER	
104	1-810-691-11	PHOTO DIODE PN263L-NC	
105	3-960-927-01	GEAR, S REEL	
106	3-961-002-01	LEVER, S SOFT	
107	3-961-003-01	SPRING, S SOFT	
108	3-961-023-01	SPRING, EP SWITCH	
109	3-961-022-01	LEVER, EP SWITCH	
110	1-810-690-11	LED LN59L	
111	1-801-326-11	PHOTO COUPLER SG-105F	
112	3-961-305-01	GEAR, FRONT RACK	
113	3-961-306-01	GEAR, START RACK	
114	3-961-307-01	SPRING, FRONT RACK	
115	3-961-021-01	SCREW (2.6X6), SPECIAL	
116	3-961-001-01	SPRING, T SOFT	
117	3-963-784-01	BRAKE (ASSY), SOFT	
118	3-191-422-01	SCREW (2.6X5.5), SPECIAL (E120AE,E220AE,UY,VP2,E270CP)	
119	3-948-603-01	WASHER, SPECIAL	
120	3-960-926-01	PULLEY, REEL	
121	3-960-928-01	GEAR, T REEL	
122	3-963-786-01	BRAKE (ASSY), T	
123	3-966-765-01	SPRING, BRAKE	
124	3-963-785-01	BRAKE (ASSY), S	
125	3-960-925-01	SCREW (2.6X4), SPECIAL	
126	A-6779-840-A	CLUTCH MOUNT BOARD, COMPLETE	

7-3. MECHANISM PARTS-2



Ref. No.	Part No.	Description	Remark
151	3-961-032-01	SCREW (2.6X6), SPECIAL	
152	3-961-047-01	MOTOR ASSY, LOADING	
153	3-961-049-01	DAMPER	
154	3-961-048-01	GEAR (COMPL), WORM	
155	3-961-050-01	GEAR (1), WHEEL	
156	3-963-793-01	GEAR (2), WHEEL	
157	3-963-794-01	CAM, MAIN	
158	3-973-491-01	WASHER (3.6X0.5), SPECIAL	
159	3-963-780-01	SWITCH (P-IT), MODE	
160	3-961-034-01	SCREW (2.6X8), SPECIAL	
161	3-961-011-01	SPRING, BRAKE RETURN	
162	3-963-788-01	BAR (ASSY), ACT BRAKE LEVER	
163	3-963-787-01	LEVER, CONTROL BRAKE	
164	3-961-013-01	SPRING, CLUTCH CHANGE	
165	3-961-012-01	LEVER, CLUTCH CHANGE	
166	3-960-921-01	SCREW (2.6X6), SPECIAL	
167	3-974-757-01	RETAINER, CAPSTAN	
168	3-960-929-01	BELT, REEL	
169	1-698-579-11	MOTOR, CAPSTAN DC 3W(E270 & E280 Series)	

Ref. No.	Part No.	Description	Remark
169	1-698-590-11	MOTOR, CAPSTAN DC 3W(E120AE,E220 Series)	
170	A-6796-534-A	MC-1 BOARD, COMPLETE	
171	3-960-925-01	SCREW (2.6X4), SPECIAL	
172	3-963-796-01	MOUNT, CRESCENT	
* 173	3-963-795-01	SLIDE, CRESCENT	
174	A-6779-673-A	GEAR ASSY, T ROAD BOARD, COMPLETE	
175	3-960-998-01	GEAR, T ROAD	
176	3-961-035-01	SPRING, T ROAD	
177	3-970-882-01	LEVER (ASSY), T ROAD	
178	3-970-879-01	GROUND (ASSY), CYL	
179	A-6779-672-A	GEAR ASSY, S ROAD BOARD, COMPLETE	
180	3-960-995-01	GEAR, S ROAD	
181	3-960-996-01	SPRING, S ROAD	
182	3-970-881-01	LEVER (ASSY), S ROAD	
183	3-960-982-01	LEVER ASSY, BT SPRING	
184	3-963-783-01	GEAR (ASSY), FRICTION	
185	3-735-755-01	WASHER (DIA.2.6)	
186	3-961-007-01	SLIDE, S ACT BRAKE	

SECTION 8
ELECTRICAL PARTS LIST

CP-A

NOTE :

- Due to standardization, replacements in the parts list may be different from the parts specified in the diagrams or the components used on the set.
- -XX, -X mean standardized parts, so they may have some difference from the original one.
- RESISTORS
  All resistors are in ohms
  METAL : Metal-film resistor
  METAL OXIDE :Metal oxide-film resistor
  F : nonflammable
- Items marked " * "are not stocked since they are seldom required for routine service. Some delay should be anticipated when ordering these items.
- SEMICONDUCTORS
  In each case, u : µ , for example :
  uA.... : µ A.... , uPA.... : µ PA....
  uPB.... : µ PB.... , uPC.... : µ PC....
  uPD.... : µ PD....
- CAPACITORS
  uF : µ F
- COILS
  uH : µ H

The components identified by mark ⚠ or dotted line with mark ⚠ are critical for safety.
Replace only with part number specified.

When indicating parts by reference number, please include the board.

The CP-A board and CP-1 board are identical.

Ref. No.	Part No.	Description			Remark
*	A-6796-554-A	CP-A BOARD, COMPLETE (E280UX)			
*	A-6796-566-A	CP-A BOARD, COMPLETE (E280VC1)			
*	A-6796-570-A	CP-A BOARD, COMPLETE (E280VC2)			
*	A-6796-572-A	CP-A BOARD, COMPLETE (E280CP)			
*	A-6796-581-A	CP-A BOARD, COMPLETE (E270VC1,VC2)			
*	A-6796-594-A	CP-A BOARD, COMPLETE (E220UY)			
*	A-6796-599-A	CP-A BOARD, COMPLETE (E220AE)			
*	A-6796-560-A	CP-A BOARD, COMPLETE (E220VP1)			
*	A-6796-602-A	CP-A BOARD, COMPLETE (E220VP2)			
*	A-6796-604-A	CP-A BOARD, COMPLETE (E120AE)			
*	A-6796-591-A	CP-A BOARD, COMPLETE (E270CP)			
		**********			
	1-533-583-11	HOLDER, FUSE			
		< CAPACITOR >			
C1001	1-126-301-11	ELECT	1uF	20%	50V
C1002	1-111-241-11	ELECT	10uF	20%	16V
C1003	1-126-154-11	ELECT	47uF	20%	6.3V
C1004	1-164-004-11	CERAMIC CHIP	0.1uF	10%	25V
C1005	1-126-154-11	ELECT	47uF	20%	6.3V
C1006	1-164-004-11	CERAMIC CHIP	0.1uF	10%	25V
C1007	1-126-301-11	ELECT	1uF	20%	50V
C1009	1-109-889-11	ELECT	1uF	20%	50V
C1010	1-164-076-11	CERAMIC	180PF	10%	50V
C1011	1-162-288-31	CERAMIC	330PF	10%	50V
C1012	1-162-209-31	CERAMIC	27PF	5%	50V
C1013	1-124-234-00	ELECT	22uF	20%	16V
C1014	1-102-129-00	CERAMIC	10000PF	10%	50V
C1015	1-162-211-11	CERAMIC	33PF	5%	50V
C1016	1-102-129-00	CERAMIC	10000PF	10%	50V
C1017	1-102-129-00	CERAMIC	10000PF	10%	50V
C1018	1-161-059-00	CERAMIC	0.047uF	10%	50V
C1019	1-126-301-11	ELECT	1uF	20%	50V
C1021	1-161-059-00	CERAMIC	0.047uF	10%	50V
C1022	1-126-301-11	ELECT	1uF	20%	50V
C1023	1-161-059-00	CERAMIC	0.047uF	10%	50V
C1024	1-161-772-11	CERAMIC	0.1uF	10%	25V
C1025	1-102-129-00	CERAMIC	10000PF	10%	50V
C1026	1-126-301-11	ELECT	1uF	20%	50V
C1027	1-161-055-00	CERAMIC	0.022uF	10%	50V
C1028	1-126-301-11	ELECT	1uF	20%	50V
C1029	1-126-154-11	ELECT	47uF	20%	6.3V
C1030	1-164-004-11	CERAMIC CHIP	0.1uF	10%	25V
C1031	1-102-129-00	CERAMIC	10000PF	10%	50V
C1032	1-126-301-11	ELECT	1uF	20%	50V

Ref. No.	Part No.	Description			Remark
C1033	1-163-099-00	CERAMIC CHIP	18PF	5%	50V
C1040	1-111-241-11	ELECT	10uF	20%	16V
C1041	1-162-209-31	CERAMIC	27PF	5%	50V
C1043	1-109-889-11	ELECT	1uF	20%	50V
			(E120AE,E220 Series,E280UX)		
C1044	1-101-880-11	CERAMIC	47PF	5%	50V
			(EXCEPT E270 Series,E280CP,VC1,VC2)		
C1046	1-164-086-11	CERAMIC	0.0012uF	20%	50V
C1047	1-101-880-11	CERAMIC	47PF	5%	50V
C1048	1-162-203-31	CERAMIC	15PF	5%	50V
C1050	1-162-203-31	CERAMIC	15PF	5%	50V
C1051	1-101-880-11	CERAMIC	47PF	5%	50V
C1052	1-101-880-11	CERAMIC	47PF	5%	50V
				(EXCEPT E270 Series)	
C1101	1-126-301-11	ELECT	1uF	20%	50V
C1102	1-126-154-11	ELECT	47uF	20%	6.3V
C1103	1-164-004-11	CERAMIC CHIP	0.1uF	10%	25V
C1104	1-102-129-00	CERAMIC	10000PF	10%	50V
C1105	1-102-129-00	CERAMIC	10000PF	10%	50V
C1106	1-102-129-00	CERAMIC	10000PF	10%	50V
C1107	1-102-129-00	CERAMIC	10000PF	10%	50V
C1108	1-161-772-11	CERAMIC	0.1uF	10%	25V
C1109	1-164-004-11	CERAMIC CHIP	0.1uF	10%	25V
C1301	1-126-935-11	ELECT	470uF	20%	6.3V
C1302	1-164-159-21	CERAMIC	0.1uF		50V
			(E270 Series,E280CP,VC1,VC2)		
C1303	1-164-004-11	CERAMIC CHIP	0.1uF	10%	25V
C1341	1-109-889-11	ELECT	1uF	20%	50V
			(E270 Series,E280CP,VC1,VC2)		
C1342	1-164-004-11	CERAMIC CHIP	0.1uF	10%	25V
			(E270 Series,E280CP,VC1,VC2)		
C1343	1-162-215-11	CERAMIC	47PFF	5%	50V
			(EXCEPT E120AE,E220 Series)		
C1344	1-109-889-11	ELECT	1uF	20%	50V
			(E270Series,E280CP,VC1,VC2)		
C1346	1-111-241-11	ELECT	10uF	20%	16V
			(EXCEPT E120AE,E220 Series)		
C1347	1-111-241-11	ELECT	10uF	20%	16V
					(E280UX)
C1350	1-161-021-11	CERAMIC	0.047uF	10%	25V
					(E280UX)
C1351	1-111-241-11	ELECT	10uF	20%	16V
			(E270 Series,E280CP,VC1,VC2)		
C1352	1-126-301-11	ELECT	1uF	20%	50V
			(E120AE,E220 Series,E280UX)		

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Ref. No.	Part No.	Description			Remark
C1352	1-109-889-11	ELECT	1uF	20%	50V
			(E270 Series,E280CP,VC1,VC2)		
C1353	1-126-301-11	ELECT	1uF	20%	50V
					(E280 Series)
C1401	1-162-201-11	CERAMIC CHIP	12PF	5%	50V
			(EXCEPT E120AE,E220 Series)		
C1402	1-162-201-11	CERAMIC CHIP	12PF	5%	50V
			(EXCEPT E120AE,E220 Series)		
C1403	1-126-301-11	ELECT	1uF	20%	50V
			(EXCEPT E120AE,E220 Series)		
C1404	1-164-232-11	CERAMIC CHIP	0.01uF		50V
			(EXCEPT E120AE,E220 Series)		
C1405	1-126-154-11	ELECT	47uF	20%	6.3V
			(EXCEPT E120AE,E220 Series)		
C1406	1-162-207-31	CERAMIC	22PF	5%	50V
			(EXCEPT E120AE,E220 Series)		
C1407	1-162-207-31	CERAMIC	22PF	5%	50V
			(EXCEPT E120AE,E220 Series)		
C1410	1-164-073-11	CERAMIC	100PF	10%	50V
			(EXCEPT E120AE,E220 Series)		
C1411	1-164-086-11	CERAMIC	0.0012uF	20%	50V
			(EXCEPT E120AE,E220 Series)		
C1412	1-126-301-11	ELECT	1uF	20%	50V
			(EXCEPT E120AE,E220 Series)		
C2001	1-126-301-11	ELECT	1uF	20%	50V
C2002	1-163-009-11	CERAMIC CHIP	0.001uF	10%	50V
C2003	1-102-129-00	CERAMIC	10000PF	10%	50V
C2004	1-124-234-00	ELECT	22uF	20%	16V
C2005	1-124-259-11	ELECT	4.7uF	20%	50V
C2006	1-164-004-11	CERAMIC CHIP	0.1uF	10%	25V
C2007	1-124-259-11	ELECT	4.7uF	20%	50V
C2008	1-164-004-11	CERAMIC CHIP	0.1uF	10%	25V
C2009	1-126-155-11	ELECT	100uF	20%	6.3V
C2010	1-124-229-00	ELECT	33uF	20%	10V
C2011	1-124-229-00	ELECT	33uF	20%	10V
C2012	1-164-004-11	CERAMIC CHIP	0.1uF	10%	25V
C2013	1-111-241-11	ELECT	10uF	20%	16V
C2014	1-164-004-11	CERAMIC CHIP	0.1uF	10%	25V
C2015	1-164-004-11	CERAMIC CHIP	0.1uF	10%	25V
					(E280 Series)
C2016	1-124-236-11	ELECT	47uF	20%	16V
C2017	1-102-128-00	CERAMIC	0.0082uF	10%	50V
C2021	1-162-293-31	CERAMIC	820PF	10%	50V
C2022	1-164-086-11	CERAMIC	0.0012uF	20%	50V
C2023	1-161-049-00	CERAMIC	0.0068uF	10%	50V
C2024	1-161-049-00	CERAMIC	0.0068uF	10%	50V
C2025	1-124-455-11	ELECT	100uF	20%	16V
C2026	1-130-973-00	FILM	0.022uF	5%	100V
C2027	1-164-004-11	CERAMIC CHIP	0.1uF	10%	25V
C2363	1-163-009-11	CERAMIC CHIP	0.001uF	10%	50V
C2365	1-163-009-11	CERAMIC CHIP	0.001uF	10%	50V
C2367	1-163-009-11	CERAMIC CHIP	0.001uF	10%	50V
					(E280CP,VC1,VC2)
C2369	1-163-009-11	CERAMIC CHIP	0.001uF	10%	50V
					(E270 & E280 Series)
C2371	1-124-589-11	ELECT	47uF	20%	16V
					(E270 & E280 Series)
C2372	1-161-048-00	CERAMIC	0.0056uF	10%	50V
C2373	1-124-259-11	ELECT	4.7uF	20%	50V
					(E270 & E280 Series)
C3001	1-162-207-11	CERAMIC	22PF	5%	50V
C3002	1-102-953-00	CERAMIC	18PF	5%	50V
C3004	1-102-129-00	CERAMIC	10000PF	10%	50V
C3005	1-102-129-00	CERAMIC	10000PF	10%	50V
C3008	1-124-234-00	ELECT	22uF	20%	16V
C3009	1-102-129-00	CERAMIC	10000PF	10%	50V
C3011	1-164-004-11	CERAMIC CHIP	0.1uF	10%	25V
C3012	1-102-129-00	CERAMIC	10000PF	10%	50V
C3014	1-126-935-11	ELECT	470uF	20%	6.3V
C3016	1-102-129-00	CERAMIC	10000PF	10%	50V
C3017	1-163-009-11	CERAMIC CHIP	0.001uF	10%	50V
					(E220UY,E280UX)
C3019	1-164-004-11	CERAMIC CHIP	0.1uF	10%	25V
C3022	1-115-437-11	CAPACITOR	0.1uF		5.5V
C3032	1-161-772-11	CERAMIC	0.1uF	10%	25V
C3033	1-102-129-00	CERAMIC	10000PF	10%	50V
C3034	1-102-129-00	CERAMIC	10000PF	10%	50V
C3037	1-162-280-31	CERAMIC	82PF	10%	50V
					(E220UY,E280UX)
C3037	1-164-064-11	CERAMIC	56PF	5%	50V
					(EXCEPT E220UY,E280UX)
C3301	1-111-241-11	ELECT	10uF	20%	16V
C3302	1-111-241-11	ELECT	10uF	20%	16V
C3303	1-164-080-11	CERAMIC	390PF	10%	50V
					(EXCEPT E220UY,E280UX)
C3307	1-164-004-11	CERAMIC CHIP	0.1uF	10%	25V
C3314	1-111-241-11	ELECT	10uF	20%	16V
C3315	1-161-057-00	CERAMIC	0.033uF	10%	50V
C3318	1-102-861-21	CERAMIC	120PF	5%	50V
C3320	1-162-219-11	CERAMIC	68PF		
C3401	1-164-076-11	CERAMIC	180PF	10%	50V
					(E220UY,E280UX)
C3402	1-136-171-00	FILM	0.33uF	5%	50V
					(E220UY,E280UX)
C3403	1-136-169-00	FILM	0.22uF	5%	50V
					(E220UY,E280UX)
C3404	1-126-965-11	ELECT	22uF	20%	50V
C3406	1-136-165-00	FILM	0.1uF	5%	50V
					(E220UY,E280UX)
C3501	1-163-023-00	CERAMIC CHIP	0.015uF	5%	50V
C3502	1-161-049-00	CERAMIC	0.0068uF	10%	50V
C3503	1-163-023-00	CERAMIC CHIP	0.015uF	5%	50V
C3504	1-124-234-00	ELECT	22uF	20%	16V
C3505	1-124-234-00	ELECT	22uF	20%	16V
C3506	1-161-049-00	CERAMIC	0.0068uF	10%	50V
C3507	1-124-234-00	ELECT	22uF	20%	16V
C3508	1-124-234-00	ELECT	22uF	20%	16V
C3509	1-126-154-11	ELECT	47uF	20%	6.3V
C3511	1-162-286-31	CERAMIC	220PF	10%	50V
C3512	1-130-490-11	MYLAR	0.039uF	5%	50V
C3513	1-161-061-11	CERAMIC	0.068uF	10%	50V
C3514	1-136-167-00	FILM	0.15uF	5%	50V
C3515	1-130-487-00	MYLAR	0.022uF	5%	50V
C3516	1-161-375-00	CERAMIC	0.0022uF	20%	50V
C3517	1-164-087-11	CERAMIC	0.0015uF	10%	50V

When indicating parts by reference number, please include the board.

Ref. No.	Part No.	Description			Remark
C3522	1-162-294-31	CERAMIC	0.001uF	10%	50V
C3523	1-126-301-11	ELECT	1uF	20%	50V
C3524	1-102-129-00	CERAMIC	10000PF	10%	50V
C3525	1-124-465-00	ELECT	0.47uF	20%	50V
C3526	1-130-494-11	MYLAR	0.082uF	5%	50V
C3536	1-126-335-11	ELECT	220uF	20%	6.3V
C3540	1-164-073-11	CERAMIC	100PF	10%	50V
C3551	1-136-166-00	FILM	0.12uF	5%	50V (EXCEPT E220UY)
C3551	1-136-171-00	FILM	0.33uF	5%	50V (E220UY)
C3552	1-162-217-31	CERAMIC	56PF	5%	50V
C3553	1-126-301-11	ELECT	1uF	20%	50V
C3554	1-162-284-31	CERAMIC	150PF	10%	50V
C3555	1-102-129-00	CERAMIC	10000PF	10%	50V
C3556	1-163-009-11	CERAMIC CHIP	0.001uF	10%	50V
C3558	1-124-229-00	ELECT	33uF	20%	10V
C3570	1-161-063-00	CERAMIC	0.1uF	10%	50V
C3571	1-161-063-00	CERAMIC	0.1uF	10%	50V
C3581	1-136-169-00	FILM	0.22uF	5%	50V (E220UY)
⚠C5001	1-136-188-11	FILM	0.068uF	5%	250V
⚠C5002	1-136-188-11	FILM	0.068uF	5%	250V
⚠C5005	1-115-383-11	CERAMIC	0.001uF	10%	125V
⚠C5007	1-115-385-11	CERAMIC	0.0022uF	20%	400V
C5010	1-125-554-11	ELECT	47uF	20%	400V
C5011	1-124-259-11	ELECT	4.7uF	20%	50V
C5012	1-110-974-11	CAPACITOR	3300PF		500V
C5013	1-104-596-11	CAPACITOR	39PF		
C5015	1-161-772-11	CERAMIC	0.1uF	10%	25V
C5017	1-164-080-11	CERAMIC	390PF	10%	50V
C5020	1-115-678-11	CAPACITOR	47PF		
C5021	1-110-973-11	CAPACITOR	2200PF		
C5025	1-104-596-11	CAPACITOR	39PF		
C5101	1-124-525-11	ELECT	1000uF	20%	25V
C5102	1-126-916-11	ELECT	1000uF	20%	6.3V
C5103	1-126-935-11	ELECT	470uF	20%	16V
C5104	1-124-525-11	ELECT	1000uF	20%	25V
C5105	1-124-910-11	ELECT	47uF	20%	50V
C5106	1-126-947-11	ELECT	47uF	20%	35V
C5107	1-126-176-11	ELECT	220uF	20%	10V
C5111	1-124-455-00	ELECT	100uF	20%	16V
C5112	1-111-241-11	ELECT	10uF	20%	16V
C5113	1-126-162-11	ELECT	3.3uF	20%	50V
C5114	1-111-241-11	ELECT	10uF	20%	16V
C5115	1-126-162-11	ELECT	3.3uF	20%	50V
C5116	1-111-241-11	ELECT	10uF	20%	16V
C5117	1-126-162-11	ELECT	3.3uF	20%	50V
C5118	1-111-241-11	ELECT	10uF	20%	16V
C5124	1-124-464-11	ELECT	0.22uF	20%	50V
C5134	1-104-643-11	CERAMIC	330PF	20%	25V
C5135	1-130-495-11	MYLAR	0.1uF	5%	50V
		< CONNECTOR >			
CN231	1-251-522-11	SOCKET, RGB (21P)			
CN301	1-251-523-11	SOCKET, FFC (37P)			
⚠CN501	1-251-483-11	SOCKET, AC INLET			

Ref. No.	Part No.	Description	Remark
		< DIODE >	
D1001	8-719-991-33	DIODE 1SS133T-77	(E120AE,E220 Series)
D1002	8-719-991-33	DIODE 1SS133T-77	(E120AE,E220 Series)
D1003	8-719-991-33	DIODE 1SS133T-77	
D1301	8-719-991-33	DIODE 1SS133T-77	
D1302	8-719-991-33	DIODE 1SS133T-77	
D1303	8-719-991-33	DIODE 1SS133T-77	(E270CP,VC1,VC2,E280CP,VC1,VC2)
D1304	8-719-991-33	DIODE 1SS133T-77	(E270CP,VC1,VC2,E280CP,VC1,VC2)
D1341	8-719-991-33	DIODE 1SS133T-77	(E120AE,E220 Series,E280UX)
D1342	8-719-991-33	DIODE 1SS133T-77	(E120AE,E220 Series,E280UX)
D1343	8-719-991-33	DIODE 1SS133T-77 (E280UX)	
D1344	8-719-991-33	DIODE 1SS133T-77 (E280UX)	
D1345	8-719-109-88	DIODE RD5.6ES-B1	(E270CP,VC1,VC2,E280CP,VC1,VC2)
D1346	8-719-109-88	DIODE RD5.6ES-B1	(E270CP,VC1,VC2,E280CP,VC1,VC2)
D2341	8-719-991-33	DIODE 1SS133T-77	
D2371	8-719-110-41	DIODE RD15ES-B2	
D2372	8-719-109-88	DIODE RD5.6ES-B1 (E280CP,VC1,VC2)	
D2373	8-719-110-41	DIODE RD15ES-B2 (E280CP,VC1,VC2)	
D2374	8-719-109-88	DIODE RD5.6ES-B1 (E280CP,VC1,VC2)	
D3001	8-719-991-33	DIODE 1SS133T-77	
D3102	8-719-991-33	DIODE 1SS133T-77	
D3103	8-719-991-33	DIODE 1SS133T-77 (E120AE)	
D3104	8-719-991-33	DIODE 1SS133T-77 (E220UY,E280UX)	
D3106	8-719-991-33	DIODE 1SS133T-77	(E270CP,VC1,VC2,E280Series)
D3107	8-719-991-33	DIODE 1SS133T-77 (E280 Series)	
D3108	8-719-991-33	DIODE 1SS133T-77	(E270CP,VC1,VC2,E280CP,VC1,VC2)
D3111	8-719-991-33	DIODE 1SS133T-77 (E220UY,E280UX)	
D3112	8-719-991-33	DIODE 1SS133T-77 (E220UY,E280UX)	
D3115	8-719-991-33	DIODE 1SS133T-77	(E220VP1,VP2,E270VC1,VC2,E280UX,VC1,VC2)
D3116	8-719-991-33	DIODE 1SS133T-77 (E280UX)	
D3117	8-719-991-33	DIODE 1SS133T-77	(E120AE,E220 Series)
D3118	8-719-991-33	DIODE 1SS133T-77	(E220UY,E270CP,VC1,VC2,E280 Series)
D3123	8-719-991-33	DIODE 1SS133T-77	(E270CP,VC1,VC2,E280 Series)
D3124	8-719-991-33	DIODE 1SS133T-77 (E220UY,E280 Series)	
D3401	8-719-982-27	DIODE MTZJ-T-77-33C	(EXCEPT E220UY,E280UX)
D3502	8-719-991-33	DIODE 1SS133T-77	
D3554	8-719-991-33	DIODE 1SS133T-77 (E270 & E280 Series)	
D5001	1-801-646-11	DIODE DB105G-S	
D5003	8-719-901-83	DIODE 1SS83	
D5004	8-719-901-83	DIODE 1SS83	
D5006	8-719-901-83	DIODE 1SS83	
D5010	1-808-898-11	DIODE AP0IC-V0	
⚠D5013	1-810-884-11	DIODE PHOTO COUPLER PC123U2	
D5101	1-810-795-11	DIODE RL2Z-LF-C4	
D5102	1-810-795-11	DIODE RL2Z-LF-C4	

When indicating parts by reference number, please include the board.

The components identified by mark ⚠ or dotted line with mark ⚠ are critical for safety.
Replace only with part number specified.

CP-A

Ref. No.	Part No.	Description	Remark
D5103	8-719-901-83	DIODE 1SS83	
D5104	8-719-901-83	DIODE 1SS83	
D5105	1-808-899-11	DIODE AG01-V2	
D5107	8-719-109-89	DIODE RD5.6ES-B2	
D5108	8-719-109-89	DIODE RD5.6ES-B2	
D5109	8-719-109-89	DIODE RD5.6ES-B2	
D5110	8-719-110-31	DIODE RD12ES-B2	
D5111	8-719-109-93	DIODE RD6.2ES-B2	
D5112	8-719-300-45	DIODE EM-1Z	
D5113	8-719-300-45	DIODE EM-1Z	
		< FUSE >	
⚠F5001	1-532-297-00	QUICK-ACTING FUSE (T2.5AH250V)	
		< IC >	
IC101	1-801-804-11	IC LA1511ML-MPB	
IC102	8-759-439-50	IC LC89977M-TE-L	
IC131	8-759-504-94	IC BA7630S (EXCEPT E120AE,E220UY,E280UX)	
IC132	8-759-820-48	IC LA7221 (E280UX)	
IC141	1-801-645-11	IC LC74783M-9628 (EXCEPT E120AE,E220 Series)	
IC232	8-759-300-71	IC HD14053BFP (E270 & E280 Series)	
IC301	1-801-848-11	IC LC866744A-5D74 (E120AE,E220 Series)	
IC301	1-801-847-11	IC LC866748A-5D81 (E270 & E280 Series)	
IC302	8-759-353-59	IC LB1643	
IC303	1-810-318-11	IC MN1381-L(TA)	
IC304	1-810-519-11	IC AT24C02-10PC (E220UY,E280UX)	
IC304	1-810-536-11	IC AT24C04-10PC (EXCEPT E120AE,E220UY,E280UX)	
IC304	8-759-381-49	IC AT24C01A-10PC (120AE)	
IC341	1-809-787-11	IC L5631 (E220UY,E280UX)	
IC351	1-810-496-11	IC BU2896K (E270 & E280 Series)	
IC351	1-801-270-11	IC XLU2899K (E120AE,E220 Series)	
IC511	1-810-060-11	IC L5431-AA	
		< COIL >	
L1002	1-410-522-11	INDUCTOR 120uH	
L1003	1-410-519-11	INDUCTOR 68uH	
L1006	1-410-513-11	INDUCTOR 22uH	
L1007	1-410-509-11	INDUCTOR 10uH	
L1101	1-500-210-11	CORE, BEAD	
L1102	1-500-225-11	CORE, BEAD	
L1361	1-500-225-11	CORE, BEAD	
L1362	1-500-225-11	CORE, BEAD (EXCEPT E120AE,E220 Series)	
L1401	1-410-515-11	INDUCTOR 33uH(EXCEPT E120AE,E220 Series)	
L1402	1-410-518-41	INDUCTOR 56uH(EXCEPT E120AE,E220 Series)	
L2021	1-410-521-11	INDUCTOR 100uH	
L2371	1-500-210-11	CORE, BEAD	
L2372	1-500-210-11	CORE, BEAD (E270 & E280 Series)	
L2391	1-500-225-11	CORE, BEAD (E280 Series)	
L3001	1-500-225-11	CORE, BEAD	
L3003	1-500-225-11	CORE, BEAD	
L3301	1-410-509-11	INDUCTOR 10uH	
L3304	1-414-142-11	INDUCTOR 1uH	
⚠ L5001	* 1-411-767-11	FILTER, LINE	
L5010	1-414-540-11	INDUCTOR 0uH	
L5101	1-414-540-11	INDUCTOR 0uH	
L5102	1-414-540-11	INDUCTOR 0uH	
		< PROTECTOR >	
⚠PR511	1-533-613-11	PROTECTOR, IC 0.8A 50V	
⚠PR512	1-801-567-11	PROTECTOR 1.25A 125V	
		< TRANSISTOR >	
Q1002	8-729-931-02	TRANSISTOR 2SC2413KQ	
Q1003	8-729-901-01	TRANSISTOR DTC144EK	
Q1004	8-729-216-22	TRANSISTOR 2SA1162	
Q1005	8-729-920-74	TRANSISTOR 2SC2412K-QR	
Q1101	8-729-216-22	TRANSISTOR 2SA1162	
Q1102	8-729-920-74	TRANSISTOR 2SC2412K-QR	
Q1301	8-729-119-76	TRANSISTOR 2SA1175-HFE	
Q1303	8-729-119-76	TRANSISTOR 2SA1175-HFE (E270CP,VC1,VC2,E280CP,VC1,VC2)	
Q1304	8-729-216-22	TRANSISTOR 2SA1162	
Q1402	8-729-216-22	TRANSISTOR 2SA1162 (EXCEPT E120AE,E220 Series)	
Q2021	1-810-471-11	TRANSISTOR 2SC3331-S-AA	
Q2022	8-729-873-44	TRANSISTOR 2SD734-G	
Q2023	1-810-880-11	TRANSISTOR 2SA1318-S	
Q2024	1-810-471-11	TRANSISTOR 2SC3331-S-AA	
Q2025	1-810-471-11	TRANSISTOR 2SC3331-S-AA	
Q2031	8-729-901-01	TRANSISTOR DTC144EK	
Q2341	8-729-993-72	TRANSISTOR 2SA937-Q	
Q2342	8-729-881-21	TRANSISTOR 2SC2812-L5	
Q2391	8-729-216-22	TRANSISTOR 2SA1162 (E280CP,VC1,VC2)	
Q2392	8-729-901-01	TRANSISTOR DTC144EK(E280CP,VC1,VC2)	
Q3401	1-810-226-11	TRANSISTOR 2SC2960-F-SPA (E220UY,E280U	
Q3503	8-729-901-01	TRANSISTOR DTC144EK (E220UY)	
Q3504	8-729-901-01	TRANSISTOR DTC144EK	
Q3551	8-729-920-74	TRANSISTOR 2SC2412K-QR (E270 & E280 Series)	
Q3552	8-729-920-74	TRANSISTOR 2SC2412K-QR (E270 & E280 Series)	
Q3553	8-729-920-74	TRANSISTOR 2SC2412K-QR	
Q3581	8-729-901-01	TRANSISTOR DTC144EK (E220UY)	
⚠Q5001	8-729-027-98	TRANSISTOR 2SK1460LS	
Q5002	1-809-602-11	TRANSISTOR 2SC2274-F-AA	
Q5003	8-729-140-97	TRANSISTOR KSA708	
Q5004	1-809-602-11	TRANSISTOR 2SC2274-F-AA	
Q5101	8-729-205-97	TRANSISTOR 2SC3668-Y	
Q5102	8-729-194-57	TRANSISTOR 2SC945-P	
Q5103	8-729-194-57	TRANSISTOR 2SC945-P	
Q5104	8-729-205-97	TRANSISTOR 2SC3668-Y	
Q5105	1-809-323-11	TRANSISTOR 2SC1740	
Q5131	8-729-205-97	TRANSISTOR 2SC3668-Y	
Q5132	8-729-901-04	TRANSISTOR DTA114EK	
Q5133	8-729-900-53	TRANSISTOR DTC114EK	
Q5134	8-729-119-78	TRANSISTOR 2SC2785-HFE	
		< RESISTOR >	
R1002	1-216-065-00	METAL CHIP 4.7K 5% 1/10W	
R1003	1-216-055-00	METAL CHIP 1.8K 5% 1/10W	
R1004	1-216-051-00	METAL CHIP 1.2K 5% 1/10W	

When indicating parts by reference number, please include the board.

The components identified by mark ⚠ or dotted line with mark ⚠ are critical for safety.
Replace only with part number specified.

Ref. No.	Part No.	Description			Remark
R1005	1-216-041-11	METAL GLAZE	470	5%	1/10W
R1006	1-216-041-11	METAL GLAZE	470	5%	1/10W
R1011	1-216-049-11	METAL GLAZE	1K	5%	1/10W
R1012	1-216-089-00	METAL CHIP	47K	5%	1/10W
R1014	1-216-055-00	METAL CHIP	1.8K	5%	1/10W
R1015	1-216-071-00	METAL CHIP	8.2K	5%	1/10W
R1016	1-216-053-00	METAL CHIP	1.5K	5%	1/10W
R1017	1-249-433-11	CARBON	22K	5%	1/4W
			(EXCEPT E120AE,E220 Series)		
R1017	1-249-430-11	CARBON	12K	5%	1/4W
				(E120AE,E220 Series)	
R1018	1-249-419-11	CARBON	1.5K	5%	1/4W
R1018	1-249-419-11			(E120AE,E220 Series)	
R1021	1-216-051-00	METAL CHIP	1.2K	5%	1/10W
R1022	1-216-041-11	METAL GLAZE	470	5%	1/10W
R1023	1-216-057-00	METAL CHIP	2.2K	5%	1/10W
R1024	1-216-049-11	METAL GLAZE	1K	5%	1/10W
R1025	1-216-295-11	METAL CHIP	0	5%	1/10W
R1028	1-216-057-00	METAL CHIP	2.2K	5%	1/10W
R1033	1-249-411-11	CARBON	330	5%	1/4W
			(E120AE,E220 Series,E280UX)		
R1034	1-216-039-00	METAL CHIP	390	5%	1/10W
			(E120AE,E220 Series,E280UX)		
R1040	1-216-065-00	METAL CHIP	4.7K	5%	1/10W
R1042	1-216-295-11	METAL CHIP	0	5%	1/10W
R1045	1-216-123-11	METAL CHIP	1.2M	5%	1/10W
R1046	1-216-295-11	METAL CHIP	0	5%	1/10W
R1047	1-216-295-11	METAL CHIP	0	5%	1/10W
R1048	1-216-295-11	METAL CHIP	0	5%	1/10W
R1049	1-216-295-11	METAL CHIP	0	5%	1/10W
R1101	1-216-057-00	METAL CHIP	2.2K	5%	1/10W
R1102	1-216-057-00	METAL CHIP	2.2K	5%	1/10W
R1104	1-249-420-11	CARBON	1.8K	5%	1/4W
R1301	1-249-412-11	CARBON	390	5%	1/4W
			(E120AE,E220 Series,E280UX)		
R1301	1-249-414-11	CARBON	560	5%	1/4W
			(E270CP,VC1,VC2,E280CP,VC1,VC2)		
R1303	1-247-804-11	CARBON	75	5%	1/4W
R1309	1-249-415-11	CARBON	680	5%	1/4W
			(E270CP,VC1,VC2,E280CP,VC1,VC2)		
R1310	1-249-415-11	CARBON	680	5%	1/4W
			(E270CP,VC1,VC2,E280CP,VC1,VC2)		
R1311	1-216-015-11	METAL CHIP	39	5%	1/10W
			(E270CP,VC1,VC2,E280CP,VC1,VC2)		
R1312	1-216-033-00	METAL CHIP	220	5%	1/10W
R1313	1-216-035-00	METAL CHIP	270	5%	1/10W
			(E120AE,E220 Series,E280UX)		
R1314	1-216-013-11	METAL CHIP	33	5%	1/10W
			(E270CP,VC1,VC2,E280CP,VC1,VC2)		
R1341	1-216-295-11	METAL CHIP	0	5%	1/10W
					(E280UX)
R1341	1-216-049-11	METAL GLAZE	1K	5%	1/10W
			(E270CP,VC1,VC2,E280CP,VC1,VC2)		
R1342	1-249-417-11	CARBON	1K	5%	1/4W
			(E270CP,VC1,VC2,E280CP,VC1,VC2)		
R1343	1-216-025-00	METAL CHIP	100	5%	1/10W
			(E270CP,VC1,VC2,E280CP,VC1,VC2)		

Ref. No.	Part No.	Description			Remark
R1344	1-216-025-00	METAL CHIP	100	5%	1/10W
			(E270CP,VC1,VC2,E280CP,VC1,VC2)		
R1345	1-216-065-00	METAL CHIP	4.7K	5%	1/10W
			(E270CP,VC1,VC2,E280CP,VC1,VC2)		
R1346	1-216-065-00	METAL CHIP	4.7K	5%	1/10W
			(E270CP,VC1,VC2,E280CP,VC1,VC2)		
R1347	1-216-065-00	METAL CHIP	4.7K	5%	1/10W
			(E270CP,VC1,VC2,E280CP,VC1,VC2)		
R1348	1-216-065-00	METAL CHIP	4.7K	5%	1/10W
			(E270CP,VC1,VC2,E280CP,VC1,VC2)		
R1349	1-216-037-00	METAL CHIP	330	5%	1/10W
			(E270CP,VC1,VC2,E280CP,VC1,VC2)		
R1350	1-216-039-00	METAL CHIP	390	5%	1/10W
			(E270CP,VC1,VC2,E280CP,VC1,VC2)		
R1352	1-216-295-11	METAL CHIP	0	5%	1/10W
R1404	1-216-061-00	METAL CHIP	3.3K	5%	1/10W
			(EXCEPT E120AE,E220 Series)		
R1405	1-216-033-00	METAL CHIP	220	5%	1/10W
			(EXCEPT E120AE,E220 Series)		
R1408	1-216-035-00	METAL CHIP	270	5%	1/10W
			(E270CP,VC1,VC2,E280CP,VC1,VC2)		
R1409	1-216-295-11	METAL CHIP	0	5%	1/10W
				(E120AE,E220 Series)	
R1410	1-216-033-00	METAL CHIP	220	5%	1/10W
R2001	1-216-065-00	METAL CHIP	4.7K	5%	1/10W
R2002	1-216-677-11	METAL CHIP	12K	0.5%	1/10W
R2003	1-216-677-11	METAL CHIP	12K	0.5%	1/10W
R2004	1-216-109-00	METAL CHIP	330K	5%	1/10W
R2005	1-216-028-00	METAL CHIP	130	5%	1/10W
R2006	1-216-061-00	METAL CHIP	3.3K	5%	1/10W
R2007	1-216-065-00	METAL CHIP	4.7K	5%	1/10W
R2008	1-216-071-00	METAL CHIP	8.2K	5%	1/10W
R2009	1-216-133-00	METAL CHIP	3.3M	5%	1/10W
R2010	1-216-085-00	METAL CHIP	33K	5%	1/10W
R2011	1-216-073-00	METAL CHIP	10K	5%	1/10W
R2012	1-216-071-00	METAL CHIP	8.2K	5%	1/10W
R2013	1-216-085-00	METAL CHIP	33K	5%	1/10W
R2014	1-216-085-00	METAL CHIP	33K	5%	1/10W
					(E280 Series)
R2015	1-216-073-00	METAL CHIP	10K	5%	1/10W
					(E280 Series)
R2017	1-216-073-00	METAL CHIP	10K	5%	1/10W
R2021	1-216-083-00	METAL CHIP	27K	5%	1/10W
R2022	1-216-055-00	METAL CHIP	1.8K	5%	1/10W
R2023	1-216-049-11	METAL GLAZE	1K	5%	1/10W
R2024	1-216-017-00	METAL CHIP	47	5%	1/10W
R2025	1-249-381-11	CARBON	1	5%	1/4W
R2026	1-216-057-00	METAL CHIP	2.2K	5%	1/10W
R2027	1-216-057-00	METAL CHIP	2.2K	5%	1/10W
R2028	1-216-031-00	METAL CHIP	180	5%	1/10W
R2029	1-216-073-00	METAL CHIP	10K	5%	1/10W
R2030	1-216-081-00	METAL CHIP	22K	5%	1/10W
R2031	1-216-295-11	METAL CHIP	0	5%	1/10W
R2331	1-216-051-00	METAL CHIP	1.2K	5%	1/10W
R2332	1-216-059-00	METAL CHIP	2.7K	5%	1/10W
R2340	1-249-411-11	CARBON	330	5%	1/4W
R2341	1-216-067-00	METAL CHIP	5.6K	5%	1/10W

When indicating parts by reference number, please include the board.

CP-A

Ref. No.	Part No.	Description			Remark
R2342	1-216-067-00	METAL CHIP	5.6K	5%	1/10W
R2343	1-249-405-11	CARBON	100	5%	1/4W
R2344	1-216-073-00	METAL CHIP	10K	5%	1/10W
R2345	1-216-073-00	METAL CHIP	10K	5%	1/10W
R2347	1-216-065-00	METAL CHIP	4.7K	5%	1/10W
R2363	1-216-043-00	METAL CHIP	560	5%	1/10W
R2365	1-216-059-00	METAL CHIP	2.7K	5%	1/10W
R2366	1-216-059-00	METAL CHIP	2.7K	5%	1/10W
R2367	1-216-043-00	METAL CHIP	560	5%	1/10W
					(E280CP,VC1,VC2)
R2369	1-216-059-00	METAL CHIP	2.7K	5%	1/10W
					(E270 & E280 Series)
R2370	1-216-059-00	METAL CHIP	2.7K	5%	1/10W
					(E270 & E280 Series)
R2371	1-249-430-11	CARBON	12K	5%	1/4W
					(E280CP,VC1,VC2)
R2372	1-249-428-11	CARBON	8.2K	5%	1/4W
					(E280CP,VC1,VC2)
R2373	1-216-071-00	METAL CHIP	8.2K	5%	1/10W
					(E270 & E280 Series)
R2376	1-216-049-11	METAL GLAZE	1K	5%	1/10W
					(E280CP,VC1,VC2)
R2377	1-216-049-11	METAL GLAZE	1K	5%	1/10W
					(E270 & E280 Series)
R2378	1-216-049-11	METAL GLAZE	1K	5%	1/10W
					(E280CP,VC1,VC2)
R2380	1-216-295-11	METAL CHIP	0	5%	1/10W
R2381	1-216-049-11	METAL GLAZE	1K	5%	1/10W
R2382	1-216-073-00	METAL CHIP	10K	5%	1/10W
					(E270 & E280 Series)
R2383	1-216-059-00	METAL CHIP	2.7K	5%	1/10W
					(E270 & E280 Series)
R2384	1-216-025-00	METAL CHIP	100	5%	1/10W
					(E270 & E280 Series)
R2386	1-216-025-00	METAL CHIP	100	5%	1/10W
					(E280CP,VC1,VC2)
R2387	1-216-025-00	METAL CHIP	100	5%	1/10W
					(E270 & E280 Series)
R2391	1-216-022-00	METAL CHIP	75	5%	1/10W
					(E280CP,VC1,VC2)
R2392	1-216-022-00	METAL CHIP	75	5%	1/10W
					(E270 & E280 Sreies)
R2393	1-216-065-00	METAL CHIP	4.7K	5%	1/10W
					(E280CP,VC1,VC2)
R2394	1-216-057-00	METAL CHIP	2.2K	5%	1/10W
					(E280CP,VC1,VC2)
R2396	1-216-022-00	METAL CHIP	75	5%	1/10W
					(E120AE,E220 & E270 Sreies,E280UX)
R3001	1-212-946-11	FUSIBLE	3.3	5%	1/2W
R3004	1-216-053-00	METAL CHIP	1.5K	5%	1/10W
R3005	1-216-045-00	METAL CHIP	680	5%	1/10W
R3008	1-216-065-00	METAL CHIP	4.7K	5%	1/10W
R3009	1-216-047-00	METAL CHIP	820	5%	1/10W
R3011	1-249-437-11	CARBON	47K	5%	1/4W
R3013	1-216-065-00	METAL CHIP	4.7K	5%	1/10W
R3014	1-247-860-11	CARBON	16K	5%	1/4W
R3015	1-247-860-11	CARBON	16K	5%	1/4W
R3018	1-216-069-11	METAL GLAZE	6.8K	5%	1/10W

Ref. No.	Part No.	Description			Remark
R3019	1-216-079-00	METAL CHIP	18K	5%	1/10W
R3023	1-216-049-11	METAL GLAZE	1K	5%	1/10W
R3024	1-216-049-11	METAL GLAZE	1K	5%	1/10W
R3025	1-216-049-11	METAL GLAZE	1K	5%	1/10W
R3026	1-216-049-11	METAL GLAZE	1K	5%	1/10W
R3030	1-216-083-00	METAL CHIP	27K	5%	1/10W
R3031	1-216-073-00	METAL CHIP	10K	5%	1/10W
R3032	1-249-435-11	CARBON	33K	5%	1/4W
R3036	1-249-421-11	CARBON	2.2K	5%	1/4W
R3037	1-216-083-00	METAL CHIP	27K	5%	1/10W
					(E220UY,E280UX)
R3037	1-216-689-11	METAL CHIP	39K	0.5%	1/10W
					(EXCEPT E220UY,E280UX)
R3047	1-216-055-00	METAL CHIP	1.8K	5%	1/10W
R3048	1-216-051-00	METAL CHIP	1.2K	5%	1/10W
R3049	1-216-059-00	METAL CHIP	2.7K	5%	1/10W
R3050	1-216-081-00	METAL CHIP	22K	5%	1/10W
R3051	1-216-081-00	METAL CHIP	22K	5%	1/10W
R3059	1-249-429-11	CARBON	10K	5%	1/4W
R3090	1-249-409-11	CARBON	220	5%	1/4W
R3091	1-249-409-11	CARBON	220	5%	1/4W
R3092	1-249-409-11	CARBON	220	5%	1/4W
R3094	1-249-418-11	CARBON	1.2K	5%	1/4W
					(E120AE,E220 Series,E280UX)
R3095	1-249-418-11	CARBON	1.2K	5%	1/4W
					(E120AE,E220 Series,E280UX)
R3101	1-249-429-11	CARBON	10K	5%	1/4W
R3102	1-249-429-11	CARBON	10K	5%	1/4W
R3103	1-249-429-11	CARBON	10K	5%	1/4W
R3104	1-216-073-00	METAL CHIP	10K	5%	1/10W
R3301	1-216-039-11	METAL CHIP	390	5%	1/10W
R3302	1-216-053-11	METAL CHIP	1.5K	5%	1/10W
R3305	1-216-061-00	METAL CHIP	3.3K	5%	1/10W
R3306	1-216-065-00	METAL CHIP	4.7K	5%	1/10W
R3309	1-220-817-11	REGISTER	680		
R3401	1-216-085-00	METAL CHIP	33K	5%	1/10W
					(E220UY,E280UX)
R3402	1-216-073-00	METAL CHIP	10K	5%	1/10W
					(E220UY,E280UX)
R3403	1-216-027-00	METAL CHIP	120	5%	1/10W
					(E220UY,E280UX)
R3404	1-249-429-11	CARBON	10K	5%	1/4W
					(E220UY,E280UX)
R3405	1-216-079-00	METAL CHIP	18K	5%	1/10W
					(E220UY,E280UX)
R3406	1-208-810-11	METAL GLAZE	15K	1%	1/10W
					(E220UY,E280UX)
R3407	1-216-677-11	METAL CHIP	12K	0.5%	1/10W
					(E220UY,E280UX)
R3501	1-249-441-11	CARBON	100K	5%	1/4W
R3502	1-216-097-00	METAL CHIP	100K	5%	1/10W
R3503	1-216-109-00	METAL CHIP	330K	5%	1/10W
R3504	1-247-883-00	CARBON	150K	5%	1/4W
R3505	1-249-431-11	CARBON	15K	5%	1/4W
R3506	1-216-105-00	METAL CHIP	220K	5%	1/10W
R3507	1-247-883-00	CARBON	150K	5%	1/4W
R3508	1-249-434-11	CARBON	27K	5%	1/4W

When indicating parts by reference number, please include the board.

Ref. No.	Part No.	Description			Remark
R3508	1-249-437-11	CARBON	47K	5%	1/4W (E220UY)
R3516	1-216-072-00	METAL CHIP	9.1K	5%	1/10W
R3517	1-216-089-00	METAL CHIP	47K	5%	1/10W
R3518	1-249-437-11	CARBON	47K	5%	1/4W
R3520	1-216-111-00	METAL CHIP	390K	5%	1/10W
R3521	1-216-073-00	METAL CHIP	10K	5%	1/10W
R3525	1-249-417-11	CARBON	1K	5%	1/4W
R3526	1-216-057-00	METAL CHIP	2.2K	5%	1/10W
R3527	1-216-049-11	METAL GLAZE	1K	5%	1/10W
R3528	1-249-442-11	CARBON	510	5%	1/4W
R3529	1-249-442-11	CARBON	510	5%	1/4W
R3533	1-249-419-11	CARBON	1.5K	5%	1/4W (E220UY)
R3537	1-216-071-00	METAL CHIP	8.2K	5%	1/10W
R3546	1-249-425-11	CARBON	4.7K	5%	1/4W
R3547	1-208-810-11	METAL GLAZE	15K	1%	1/10W
R3549	1-216-073-00	METAL CHIP	10K	5%	1/10W
R3550	1-216-071-00	METAL CHIP	8.2K	5%	1/10W
R3551	1-216-073-00	METAL CHIP	10K	5%	1/10W (E270 & E280 Series)
R3552	1-216-097-00	METAL CHIP	100K	5%	1/10W (E270 & E280 Series)
R3553	1-247-887-00	CARBON	220K	5%	1/4W (E270 & E280 Series)
R3555	1-216-097-00	METAL CHIP	100K	5%	1/10W (E270 & E280 Series)
R3556	1-216-073-00	METAL CHIP	10K	5%	1/10W
R3557	1-216-109-00	METAL CHIP	330K	5%	1/10W
R3558	1-216-041-11	METAL GLAZE	470	5%	1/10W
R3560	1-216-049-11	METAL GLAZE	1K	5%	1/10W
R3581	1-249-438-11	CARBON	56K	5%	1/4W (E220UY)
R5001	1-202-724-00	SOLID	2.7M	10%	1/2W
R5002	1-216-031-00	METAL CHIP	180	5%	1/10W
R5003	1-249-420-11	CARBON	1.8K	5%	1/4W
R5004	1-216-109-00	METAL CHIP	330K	5%	1/10W
R5005	1-216-295-11	METAL CHIP	0	5%	1/10W
R5006	1-216-073-00	METAL CHIP	10K	5%	1/10W
R5007	1-216-081-00	METAL CHIP	22K	5%	1/10W
R5009	1-216-093-11	METAL GLAZE	68K	5%	1/10W
R5010	1-247-893-11	CARBON	390K	5%	1/4W
R5011	1-247-893-11	CARBON	390K	5%	1/4W
R5020	1-215-903-11	METAL OXIDE	68K	5%	2W
R5021	1-215-903-11	METAL OXIDE	68K	5%	2W
R5101	1-249-411-11	CARBON	330	5%	1/4W
R5102	1-216-039-00	METAL CHIP	390	5%	1/10W
R5103	1-249-414-11	CARBON	560	5%	1/4W
R5104	1-249-423-11	CARBON	3.3K	5%	1/4W
R5105	1-249-409-11	CARBON	220	5%	1/4W
R5106	1-249-413-11	CARBON	470	5%	1/4W
R5108	1-216-055-00	METAL CHIP	1.8K	5%	1/10W
R5109	1-249-423-11	CARBON	3.3K	5%	1/4W
R5110	1-212-867-00	FUSIBLE	27	5%	1/4W
R5111	1-249-442-11	CARBON	510	5%	1/4W
R5112	1-216-063-00	METAL CHIP	3.9K	5%	1/10W
R5114	1-249-401-11	CARBON	47	5%	1/4W

Ref. No.	Part No.	Description			Remark
R5120	1-249-668-11	CARBON	8.2	5%	1/4W
R5121	1-249-386-11	CARBON	2.7	5%	1/4W
R5123	1-249-420-11	CARBON	1.8K	5%	1/4W
R5132	1-249-423-11	CARBON	3.3K	5%	1/4W
R5133	1-249-428-11	CARBON	8.2K	5%	1/4W
R5134	1-249-423-11	CARBON	3.3K	5%	1/4W
R5135	1-216-027-00	METAL CHIP	120	5%	1/10W
		< TRANSFORMER >			
T2001	1-431-150-11	TRANSFORMER, OSC 70KHz			
T5001	1-431-151-11	TRANSFORMER, PULSE POWER			
		< VARIABLE RESISTOR >			
VR351	1-228-998-00	RES, ADJ, METAL 220K (SW-P)			
		< VIBRATOR >			
X1001	1-760-652-11	CRYSTAL OSC (4.433619MHz)			
X1401	1-760-047-11	CRISTAL (17.734476MHz) (EXCEPT E120AE,E220 Series)			
X3001	1-760-653-11	CERAMIC OSC (8.5MHz)			
X3002	1-579-220-11	CRYSTAL, OSC (32KHz)			
	A-6796-534-A	MC-1 BOARD, COMPLETE			
		**********			
		< CAPACITOR >			
C8001	1-161-063-00	CERAMIC	0.1uF	10%	50V
		< RESISTOR >			
R8001	1-249-420-11	CARBON	1.8K	5%	1/4W
R8002	1-249-416-11	CARBON	820	5%	1/4W
R8003	1-249-410-11	CARBON	270	5%	1/4W
R8004	1-249-407-11	CARBON	150	5%	1/4W
		< SWITCH >			
S8002	1-762-173-11	SWITCH, EP (1P-1T) (EP SW)			
*	A-6796-532-A	TM-1 BOARD, COMPLETE			
		**********			
*	3-966-986-01	HOLDER, IR			
*	3-958-684-01	HOLDER, FL			
		< FLUORESCENT INDICATOR >			
A7101	1-517-647-11	TUBE, FLUORESCENT INDICATOR			
		< CAPACITOR >			
C7101	1-164-073-11	CERAMIC	100PF	10%	50V
C7103	1-164-073-11	CERAMIC	100PF	10%	50V
C7104	1-164-073-11	CERAMIC	100PF	10%	50V
C7113	1-124-259-11	ELECT	4.7uF	20%	50V
		< CONNECTOR >			
CN711	1-251-523-11	SOCKET, FFC (37P)			
CN712	1-251-524-11	SOCKET, RIBBON (5P)			

When indicating parts by reference number, please include the board.

The components identified by mark ⚠ or dotted line with mark ⚠ are critical for safety.
Replace only with part number specified.

TM-1 **TM-2** **TM-9**

Ref. No.	Part No.	Description	Remark
		< DIODE >	
D7103	8-719-301-58	LED SEL2910D-D (OPC)	
D7104	8-719-301-58	LED SEL2910D-D (ATR)	
D7112	8-719-991-33	DIODE 1SS133T-77	
D7113	8-719-991-33	DIODE 1SS133T-77	
D7114	8-719-991-33	DIODE 1SS133T-77	
D7115	8-719-991-33	DIODE 1SS133T-77	
		< TRANSISTOR >	
Q7101	8-729-140-97	TRANSISTOR KSA708	
Q7102	8-729-900-80	TRANSISTOR DTC114ES	
Q7103	8-729-900-80	TRANSISTOR DTC114ES	
Q7104	8-729-900-80	TRANSISTOR DTC114ES	
		< RESISTOR >	
R7101	1-249-433-11	CARBON 22K 5% 1/4W	
R7102	1-249-421-11	CARBON 2.2K 5% 1/4W	
R7103	1-249-407-11	CARBON 150 5% 1/4W	
R7104	1-249-408-11	CARBON 180 5% 1/4W	
		< RECEIVER PACK >	
RR711	1-475-047-11	RECEIVER PACK UNIT, IR	
		< SWITCH >	
S7101	1-762-303-11	SWITCH, PUSH (1P-1T)(ALL CLEAR)	
S7111	1-762-303-11	SWITCH, PUSH (1P-1T)(CH +)	
S7112	1-762-303-11	SWITCH, PUSH (1P-1T)(CH –)	
S7114	1-762-303-11	SWITCH, PUSH (1P-1T)(ATR)	
S7115	1-762-303-11	SWITCH, PUSH (1P-1T)(PAUSE)	
S7116	1-762-303-11	SWITCH, PUSH (1P-1T)(STOP)	
S7118	1-762-303-11	SWITCH, PUSH (1P-1T)(PRESET)	
S7119	1-762-303-11	SWITCH, PUSH (1P-1T)(REW)	
S7120	1-762-303-11	SWITCH, PUSH (1P-1T)(PLAY)	
S7121	1-762-303-11	SWITCH, PUSH (1P-1T)(ERASE)	
S7122	1-762-303-11	SWITCH, PUSH (1P-1T)(SEARCH)	
S7123	1-762-303-11	SWITCH, PUSH (1P-1T)(FF)	
S7124	1-762-303-11	SWITCH, PUSH (1P-1T)(REC)	
S7125	1-762-303-11	SWITCH, PUSH (1P-1T)(TR +)	
S7126	1-762-303-11	SWITCH, PUSH (1P-1T)(TR –)	
*	A-6796-533-A	TM-2 BOARD, COMPLETE(E280 Series)	
*	A-6796-541-A	TM-2 BOARD, COMPLETE(E220 & E270 Series)	
*	A-6796-633-A	TM-2 BOARD, COMPLETE(E120AE)	
		**********	
*	3-947-425-01	HOLDER, LED	
		< CAPACITOR >	
C7221	1-162-286-31	CERAMIC 220PF 10% 50V (E280 Series)	
		< CONNECTOR >	
CN722	1-251-525-11	SOCKET, RIBBON (4P) (E280 Series)	
		< DIODE >	
D7201	8-719-301-58	LED SEL2910D-D (POWER)	
D7202	8-719-301-58	LED SEL2910D-D (POWER)	
		< RESISTOR >	
R7201	1-249-408-11	CARBON 180 5% 1/4W	
R7202	1-249-408-11	CARBON 180 5% 1/4W	
R7221	1-247-804-11	CARBON 75 5% 1/4W (E280 Series)	
R7222	1-249-417-11	CARBON 1K 5% 1/4W (E280 Series)	
		< SWITCH >	
S7201	1-762-303-11	SWITCH, PUSH (1P-1T) (POWER)	
S7202	1-762-303-11	SWITCH, PUSH (1P-1T) (EJECT)	
*	A-6796-530-A	TM-9 BOARD, COMPLETE (E220VP1,VP2,E270VC1,VC2,E280UX,VC1,VC2)	
		**********	
		< CAPACITOR >	
C7701	1-130-489-11	MYLAR 0.033uF 5% 50V (E220VP1,VP2,E270VC1,VC2,E280UX,VC1,VC2)	
C7702	1-161-375-00	CERAMIC 0.0022uF 20% 50V (E220VP1,VP2,E270VC1,VC2,E280UX,VC1,VC2)	
C7703	1-136-171-00	FILM 0.33uF 5% 50V (E220VP1,VP2,E270VC1,VC2,E280UX,VC1,VC2)	
C7704	1-162-284-31	CERAMIC 150PF 10% 50V (E220VP1,VP2,E270VC1,VC2,E280UX,VC1,VC2)	
C7705	1-164-004-11	CERAMIC CHIP 0.1uF 10% 25V (E220VP1,VP2,E270VC1,VC2,E280UX,VC1,VC2)	
		< CONNECTOR >	
CN771	1-778-864-11	CONNECTOR (5P) (E220VP1,VP2,E270VC1,VC2,E280UX,VC1,VC2)	
		< IC >	
IC771	1-810-868-11	IC SDA5649 (E220VP1,VP2,E270VC1,VC2,E280UX,VC1,VC2)	
		< RESISTOR >	
R7701	1-216-069-11	METAL GLAZE 6.8K 5% 1/10W (E220VP1,VP2,E270VC1,VC2,E280UX,VC1,VC2)	
R7702	1-216-123-11	METAL CHIP 1.2M 5% 1/10W (E220VP1,VP2,E270VC1,VC2,E280UX,VC1,VC2)	
R7703	1-216-069-11	METAL GLAZE 6.8K 5% 1/10W (E220VP1,VP2,E270VC1,VC2,E280UX,VC1,VC2)	
R7704	1-216-123-11	METAL CHIP 1.2M 5% 1/10W (E220VP1,VP2,E270VC1,VC2,E280UX,VC1,VC2)	
R7705	1-216-121-00	METAL CHIP 1M 5% 1/10W (E220VP1,VP2,E270VC1,VC2,E280UX,VC1,VC2)	
R7706	1-216-057-00	METAL CHIP 2.2K 5% 1/10W (E220VP1,VP2,E270VC1,VC2,E280UX,VC1,VC2)	
R7707	1-216-097-00	METAL CHIP 100K 5% 1/10W (E220VP1,VP2,E270VC1,VC2,E280UX,VC1,VC2)	
R7708	1-216-073-00	METAL CHIP 10K 5% 1/10W (E220VP1,VP2,E270VC1,VC2,E280UX,VC1,VC2)	

When indicating parts by reference number, please include the board.

Ref. No.	Part No.	Description			Remark
*	A-6796-558-A	VP-1 BOARD, COMPLETE(E220UY,E280 Series)			
*	A-6796-535-A	VP-1 BOARD, COMPLETE (E120AE,E220AE,VP1,VP2,E270 Series)			
		**********			
		< CAPACITOR >			
C1805	1-164-004-11	CERAMIC CHIP	0.1uF	10%	25V
C1806	1-102-129-00	CERAMIC	10000PF	10%	50V
C1807	1-126-154-11	ELECT	47uF	20%	6.3V
C1808	1-164-004-11	CERAMIC CHIP	0.1uF	10%	25V
C1809	1-126-301-11	ELECT	1uF	20%	50V
C1810	1-102-129-00	CERAMIC	10000PF	10%	50V
C1812	1-162-207-31	CERAMIC	22PF	5%	50V
C1813	1-162-207-31	CERAMIC	22PF	5%	50V
C1835	1-102-129-00	CERAMIC	10000PF	10%	50V
C1836	1-161-055-00	CERAMIC	0.022uF	10%	50V
		< CONNECTOR >			
CN182	1-251-433-11	SOCKET (FFC 5P)			
		< IC >			
IC181	1-801-705-11	IC LA70002L			
		< RESISTOR >			
R1801	1-216-067-00	METAL CHIP	5.6K	5%	1/10W
R1802	1-216-053-00	METAL CHIP	1.5K	5%	1/10W (E220UY,E280 Series)
R1802	1-216-051-00	METAL CHIP	1.2K	5%	1/10W (E120AE,E220AE,VP1,VP2,E270 Series)
R1804	1-216-045-00	METAL CHIP	680	5%	1/10W
R1806	1-216-065-00	METAL CHIP	4.7K	5%	1/10W
R1807	1-216-049-11	METAL GLAZE	1K	5%	1/10W
R1831	1-216-295-11	METAL CHIP	0	5%	1/10W
R1833	1-216-295-11	METAL CHIP	0	5%	1/10W
		MISCELLANEOUS			
		**********			
8	1-693-358-11	TUNER (RF/TU/IF)(EXCEPT E220UY,E280UX)			
8	1-693-375-11	TUNER (RF/TU/IF)(E220UY,E280UX)			
25	1-777-958-11	CABLE, FLEXIBLE FLAT			
52	1-698-912-11	MOTOR, ROTOR CYL DC 2W			
54	1-698-913-11	MOTOR, STATOR CYL DC 2W			
104	1-810-691-11	PHOTO DIODE PN263L-NC			
110	1-810-690-11	LED LN59L			
111	1-801-326-11	PHOTO COUPLER SG-105F			
169	1-698-579-11	MOTOR, CAPSTAN DC 3W(E270 & E280 Series)			
169	1-698-590-11	MOTOR, CAPSTAN DC 3W(E120AE,E220 Series)			
		ACCESSORIES & PACKING MATERIALS			
		**********			
	1-475-037-41	COMMANDER, STANDARD(RMT-V206C) (E280CP,VC1,VC2)			
	1-475-037-51	COMMANDER, STANDARD (RMT-V206D) (E280UX)			

Ref. No.	Part No.	Description	Remark
	1-475-038-41	COMMANDER, STANDARD(RMT-V207C)	(E220VP1,VP2)
	1-475-038-51	COMMANDER, STANDARD(RMT-V207D)	(E220AE)
	1-475-038-61	COMMANDER, STANDARD(RMT-V207E)	(E220UY)
	1-475-039-21	COMMANDER, STANDARD(RMT-V207G)	(E120AE)
	1-475-040-11	COMMANDER, STANDARD(RMT-V207H)	(E270 Seris)
⚠	1-590-866-11	CORD, POWER (EXCEPT E220UY,E280UX)	
⚠	1-590-866-12	CORD, POWER (E220UY,E280UX)	
	3-709-128-00	COVER, BATTERY	
	3-749-104-01	CABLE, ANT (PAL) (E270VC1,VC2,E280 Series)	
	3-858-757-11	MANUAL (E280), INSTRUCTION(English)	(E280UX)
	3-858-758-11	MANUAL (E280), INSTRUCTION(Italian)	(E280CP,VC1)
	3-858-759-11	MANUAL (E280), INSTRUCTION(French)	(E280VC1)
	3-858-760-11	MANUAL (E280), INSTRUCTION(German)	(E280VC1)
	3-858-761-11	MANUAL (E280), INSTRUCTION(Dutch)	(E280VC1)
	3-858-762-11	MANUAL (E220), INSTRUCTION(Danish)	(E220VP2)
	3-858-763-11	MANUAL (E220), INSTRUCTION(Finnish)	(E220VP2)
	3-858-764-11	MANUAL (E120), INSTRUCTION(Italian)	(E120AE)
	3-858-765-11	MANUAL (E120), INSTRUCTION(French)	(E120AE)
	3-858-766-11	MANUAL (E120), INSTRUCTION(German)	(E120AE)
	3-858-767-11	MANUAL (E120), INSTRUCTION(Dutch)	(E120AE)
	3-858-768-11	MANUAL (E120), INSTRUCTION(Spanish)	(E120AE)
	3-858-769-11	MANUAL (E120), INSTRUCTION(Portuguese)	(E120AE)
	3-858-770-11	MANUAL (E280), INSTRUCTION(Swedish)	(E280VC2)
	3-858-771-11	MANUAL (E280), INSTRUCTION(Danish)	(E280VC2)
	3-858-772-11	MANUAL (E280), INSTRUCTION(Finnish)	(E280VC2)
	3-858-773-11	MANUAL (E280), INSTRUCTION(Portuguese)	(E280VC2)
	3-858-774-11	MANUAL (E280), INSTRUCTION(Spanish)	(E280CP)
	3-858-776-11	MANUAL (E270), INSTRUCTION(French)	(E270VC1)
	3-858-777-11	MANUAL (E270), INSTRUCTION(German)	(E270VC1)
	3-858-778-11	MANUAL (E270), INSTRUCTION(Spanish)	(E270CP)
	3-858-780-11	MANUAL (E220), INSTRUCTION(English)	(E220UY)

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Replace only with part number specified.

Ref. No.	Part No.	Description	Remark
	3-858-781-11	MANUAL (E220), INSTRUCTION(Italian)	(E220AE,VP1)
	3-858-784-11	MANUAL (E220), INSTRUCTION(French)	(E220VP1)
	3-858-785-11	MANUAL (E220), INSTRUCTION(German)	(E220VP1)
	3-858-786-11	MANUAL (E220), INSTRUCTION(Dutch)	(E220VP1)
	3-858-787-11	MANUAL (E220), INSTRUCTION(Swedish)	(E220VP2)
	3-859-727-11	MANUAL (E270), INSTRUCTION(Italian)	(E270VC1)
	3-859-728-11	MANUAL (E270), INSTRUCTION(Dutch)	(E270VC1)
	3-860-121-11	MANUAL, INSTRUCTION (E270)(Danish)	(E270VC2)
	3-860-122-11	MANUAL, INSTRUCTION (E270)(Swedish)	(E270VC2)
	3-860-123-11	MANUAL, INSTRUCTION (E270)(Finnish)	(E270VC2)
*	3-974-753-01	CUSHION (FRONT)	
*	3-974-754-01	CUSHION (BACK)	
*	3-975-632-01	INDIVIDUAL CARTON (E280UX)	
*	3-975-634-01	INDIVIDUAL CARTON (E220AE,VP1,VP2)	
*	3-975-729-01	INDIVIDUAL CARTON (E280CP,VC1,VC2)	
*	3-975-931-01	INDIVIDUAL CARTON (E270CP,VC1,VC2)	
*	3-976-016-01	INDIVIDUAL CARTON (E220UY)	
*	3-976-144-01	INDIVIDUAL CARTON (E120AE)	

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HARDWARE LIST

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#1	7-685-647-79	SCREW +BVTP 3X10 TYPE2 N-S
#2	7-685-645-79	SCREW +BVTP 3X6 TYPE2 N-S
#3	7-685-646-79	SCREW +BVTP 3X8 TYPE2 N-S
#4	7-682-648-09	SCREW (3X8), +PW
#5	7-685-661-19	SCREW +BVTP 4X12 TYPE2 N-S

Sony Corporation
Home A&V Products Company

9-921-637-11

97D0259-1
Printed in Japan © 1997.4
Published by Service and Safety
Engineering Dept. (Osaki East)